The Builder.

VOL. XXXI.—No. 1567.

Covent Garden Market.

PICTURE of fields over which streets and squares have since been erected cannot fail to strike the popular imagination by the change it discovers. We see this change continually occurring in the outskirts of great cities, but it seems hard for us to realise that the centre of London was in the same condition a few centuries ago. Few who go to buy fruits or flowers at Covent Garden Market think that before the abolishment of conventual establishments by Henry VIII. the place where they are walking was occupied by the garden and burial-ground of a convent, although the name tells them that it was so. In the grand distribution of ecclesiastical spoils, Edward Seymour, Duke of Somerset, brother-in-law of Henry VIII., and afterwards Protector of the Realm in the reign of Edward VI., obtained the land previously belonging to the Westminster monks as part of his share. In the year 1552, however, when he was beheaded, it reverted to the Crown, and "a patent [was] granted to John, Earl of Bedford, of the gifts of the Convent Garden, lying in the parish of St. Martin-in-the-Fields, near Charing Cross, with seven acres, called Long-acre, of the yearly value of 6*l.* 6*s.* 8*d.*, parcel of the possessions of the late Duke of Somerset, to have to him and his heirs, reserving a tenure to the king's majesty in socage and not in capite" ("Privy Council Records," March, 1552). The earl built himself a timber mansion in the same year on the site of Southampton-street, with a garden that ran down to the Strand, and an entrance from that thoroughfare, but the rest of the land he did not use. Covent Garden continued for some years to be an enclosure or pasture, extending westward from "the comune high waye that leadeth from the Stronde to St. Giles-in-the-fyeldes" (now Drury-lane), almost to the present St. Martin's-lane. Queen Elizabeth's trusty Secretary of State, Sir William Cecil, lived in a house on the north side of the Strand, almost adjoining Bedford House, of the presence of which we are reminded by Burleigh and Exeter streets, the titles of himself and of his son. This mansion was originally built upon the site of the parsonage-house of St. Martin's-in-the-fields by Sir Thomas Palmer, in the reign of Edward VI. Adjoining his house Cecil had an orchard, and in September, 1570, Francis, Earl of Bedford, K.G., granted to him by a lease of twenty-one years a portion of the pasture of Covent Garden, which was next to his house, at a rent of 5*s.* a year. This lease is printed in the *Archæologia* (vol. xxx., p. 497), from which we quote the description of the land:—"That the said Earle of Bedforde, for the goodwyll he beareth to the said Sr. Willm. Cecill, hath demysed, graunted, and to ferme letton, and by these presentes dothe demyse, graunte, and to ferme lett unto the said Sr. Willm. Cecill, all that his porcyon or percell of grounde lyenge in the east ende, and being percell of the enclosure or pasture communely called Covent Garden, scituate in Westm', which porcyon the said Sr. Willm. Cecill doeth and of late yeares hath occupied at the sufferannce of the said Earle, and hath bene and ys nowe dyvyeded from the rest of the said enclosure called Covent Garden on the west syde of the said porcyon or p'cell nowe demysed w^th certayne stulpes and rayles of wood, and is fensed w'th a wall of mudde or earth on the east next unto the comune high waye that leadeth from Stronde to St. Gyles-in-the-fyeldes, and on the west end towardes the south is fensed w^th the orcharde wall of the said Sr. Willm. Cecyll, and on the south end w^th a certayne fence wall of mudde or earthe, beinge therbye devyeded from certayne gardens belonginge to the inne called the Whyte Heart and other tenementes scituate in the high streate of Westm., comunly called the Stronde." The word "stulp" used in this lease is now obsolete, except in the county of Norfolk, and signifies a low post or boundary.

We hear no more of Covent Garden until about the year 1630, when another Earl of Bedford began to clear away the old buildings that were scattered over the ground, and to form the present square, by building, from the designs of Inigo Jones, a church and piazza, in imitation of the square at Leghorn. In H. Lestrange's "Annals of the Reign of Charles I." we find this adventure mentioned, under the date 1632:—"The king having granted leave to the Earl of Bedford to edify at pleasure upon the Convent Garden, it being a very ample and spacious area and content, the earl plied his design with such celerity and quick despatch, as he soon reared such numerous rows of stately and ambitious buildings as made old London envy the magnificence of her sub-urbieary city." A new fashionable quarter had been much required, and the Earl of Bedford's houses were soon let to those members of the aristocracy who had no family mansions in London. In 1634 the earl granted a lease of two houses in the Piazza to Sir Edmund Verney, Knight Marshal to Charles I., from which we learn that the colonnade was originally termed the "Portico-walk," and, therefore, that the mistake of calling the arcades the Piazzas, was of later date. A covenant was made that the earl should have free "ingresse, egresse, and regresse, into, out of, and from the sayd messuages, upon, by, over, and through the sayd Portico-walke, and that he, together with other his majesty's subjects, may at all times walke in, upon, and over the said Portico-walke, to and fro, at his and their own will and pleasure." Also, "that Sir Edmund Verney may expell, put, or drive away out of the said walke any youth or other person whatsoever, which shall eyther play or be in the said Portico-walke, in offence or disturbance to the said Sir Edmund Verney." The annual rent was "one hundred and threescore poundes,"—a large sum in those days,—which shows that the neighbourhood was in high repute. The inventory of fixtures is a very full and curious document of some interest in the history of building in England. It is printed in the *Archæologia* (vol. xxxv., p. 197).

Hollar's view of Covent Garden was taken about the year 1647, and represents a very handsome square. It is taken from Russell-street, looking straight at the church, and shows the colonnade on the south-east side, which was destroyed by the fire in the last century. Through the columns we get a peep at the trees and garden-wall of Bedford House, on the south side of the square. The centre is inclosed by open posts, and the old gabled houses in Henrietta and King streets are well shown up, adding greatly to the general picturesque effect.

The market originated in a few temporary stalls or sheds, which grew up under the shadow of the garden-wall of Bedford House. The squatters who held these stalls seem to have been recognised in 1656, as at that date the churchwardens of the parish made payment as follows:—"21 March, 1656. Paid to the painter for painting the benches and seates in the Market-place." Ten years later trees were planted "in the broad place"; and in 1668 money was collected from the inhabitants towards the expense of erecting a column in the centre of the square, which had been inclosed with railings 60 ft. distant from the buildings. This column, with a dial on the top, was taken down in June, 1790. The various improvements made in the centre area are noticed in R. Brome's comedy, "The Weeding of Covent Garden," which was published in 1658:—

> "Of Covent Garden, when he wrote his book,
> Some ten years since, when it was grown with weeds;
> Not set as now it is with noble seeds,
> Which makes the Garden glorious."

In 1671 the Earl of Bedford obtained a patent for his market, and eight years afterwards it was rated to the poor for the first time, when there were twenty-three salesmen, severally rated at 2*s.* and 1*s.* Fireworks were exhibited in the centre of the square in 1672, and again in 1690. On the last occasion they were "performed at the charge of the gentry and other inhabitants of the parish, for the joyful return of his Majesty from his conquest in Ireland," on September 10th, and were considered of enough importance to have a print made to celebrate them. Accoording to the parish books, the expenses of this entertainment were not very great, and the individual inhabitants need not have been much out of pocket:—"1690, Sept. 23. Paid to Mr. Brown, for 200 of ffagots and 30 brushes for bonefire for the parish, 1*l.* 12*s.* 6*d.* Sept. 25th, Mr. Stokes, for a barrell of ale for the bonefire, 1*l.* Given to the watchmen to drincke att the king's returne from Ireland, 2*s.* 6*d.* 1691. Given to Stokes and y^e watchmen to drincke at the bonefire and fireworks, 10*s.*" The crowds who attended these jollifications seem to have injured the enclosure, so that it was necessary to employ men to repair it:—"Oct. 12. Pd. the labourers and carters for 4 dayes worke, in laying and spreading the gravell, 1*l.* 6*s.*"

About this date Covent Garden was a favourite rendezvous of the fast men of the day. In Shadwell's play of "The Scowrers" (1691), one of the characters says, "Why, I knew the Hectors, and before them the Tityre Tu's. They were brave fellows indeed. In those days a man could not go from the Rose Tavern to the Piazza once, but he must venture his life twice." There is an old print of Covent Garden of this time, which shows Young Ramble and his drunken companions raising a riot. On it are the following verses:—

> "Young Ramble, without wit or dread,
> Does now a drunken party head:
> They sally forth, and scour the street,
> And play the Devil with all they meet;
> Swagger and swear, and riots make,
> And windows, lamps, and lanthorns break;
> Make all that dare oppose them fly,
> And midnight magistrates defy.
> On mischief bent, there's not a man
> Among them but does all he can:
> Streets, alleys, lanes, a hundred pass'd,
> To Covent Garden come at last.
> There we present 'em to your sight,
> And show their madness in its height.
> See Ramble, though he risks his life,
> Will from the husband force the wife;
> As rudely his companions treat
> All that in petticoats they meet:
> The women struggle, scream, and scratch,
> Loud swear the men:—In come the watch,
> Alarm'd by the outrageous noise,
> And fall upon the roaring boys.
> Uplifted staves, drawn swords oppose,
> And stabs are well repaid with blows."

In 1704 Bedford House was pulled down, and the market, which had up to this date crouched beneath the shadow of its wall, was pushed into the centre of the square. Strype describes the look of the place about this time as follows:—"The south side of Covent Garden-square lieth

open to Bedford-garden, where there is a small grotto of trees, most pleasant in the summer season; and on this side there is kept a market for fruits, herbs, roots, and flowers, every Tuesday, Thursday, and Saturday, which is grown to a considerable account, and well served with choice goods, which makes it much resorted unto." The market continued to prosper, and the sheds were gradually enlarged, and upper stories were added to them. This growth was watched with dislike by the vestry of the parish, who addressed a memorial, in 1748, to the Duke of Bedford, complaining that bakers, cooks, and retailers of gin lived in the added apartments, "to the injury and prejudice of the fair trader;" and further, that the value of house-property in the neighbourhood was reduced by the growth of the market; but apparently the complaints were disregarded. The place continued to deserve its ill name, as the resort of disorderly characters. Shenstone, writing in 1744, tells his friend Jago, that in the Piazza large bodies of pickpockets "attack whole parties, so that the danger of coming out of the play-houses is of some weight in the opposite scale when I am disposed to go to them oftener than I ought." There is a print, "invented and engraved by L. P. Boitard," of "The Covent Garden Morning Frolick, Oct. 9th, 1747," in which are figured some of the notorious characters of the day. The principal group consists of a drunken woman asleep in a sedan-chair, with a roaring man on the top of it. The woman was Bet Careless, and the man mad Captain Montague, a well-known noisy bully of the day. In front of the sedan is a little fellow carrying a hurdy-gurdy. This was little Casey, an extremely ugly and vicious blackguard, whose home was the dunghill. Montague and others of his set encouraged this shoe-and-stockingless link-boy, on account of his low wit. These noisy people found accommodation at the low publichouses of the neighbourhood which were kept open all night. One of these was Tom King's Coffee-house, a mere shed beneath the portico of St. Paul's Church, but made famous by its introduction into Hogarth's print of "Morning." Another was Carpenter's Coffee-house, originally the Queen's Head, but more generally known as the "Finish," one of the market sheds on the east side of the square, nearly opposite the "Hummums." Ned Shuter, the comedian, at one time a livery servant to Lampe, the composer, of Covent Garden Theatre, was pot-boy here. The presiding genius of the place, was one Jack Tetherington, a queer character, depicted in one of Deighton's caricatures as a "Deep-un." As most of these night-houses were frequented by those who had taken more liquor than was good for them, they were the scenes of frequent quarrels. One of the standing rules of the "Finish" was, that if any young man unacquainted with the place appeared in a cocked hat some regular customer of the house should force him into a quarrel. An amusing scene in which John Kemble figured, is related by John Adolphus (Recollections, p. 88). The great actor, tipsy but majestic as ever, marched into the tavern, and attempted to lead the conversation, but at last, highly indignant at the little consideration with which he was treated, he swept with one tragic sweep of his arm all the glasses of liquor off the tray that the landlady was bringing into the room for her guests. By this performance he severely cut his hands, and some friends immediately put him into a hackney coach, and sent him home.

In 1829 the sheds were all cleared away, and the site for the new market was prepared. The new building was erected in 1830, from the designs of the late Mr. Charles Fowler, at the expense of the Duke of Bedford. The market gained its great fame while it was excessively ugly, and the old sheds were as much frequented as the new building. The chief feature of the new market-house is the centre avenue, which became popular at once. Lately the holders of stalls have loudly complained of their unprotected condition, and the landlord has been asked to place a covering over them to prevent some of the inconveniences of our changeable climate. This demand he is supposed to have refused, and, in consequence, the complainants have threatened to leave in a body, and remove to Farringdon Market. Doubtless the present market, although it is a great improvement on the miserable sheds of the early part of the century, is much behind in grandeur and convenience what a market of such fame, and the chief market moreover of London, should be. Country towns have now handsome market-houses, and we might fairly look to the Duke of Bedford, who receives so large an income from Covent Garden Market, to make it worthy alike of its fame and of our great city.

FLUES AND CHIMNEY STACKS.

The visitor who arrives in London by either of the railways that lead from a port in the Channel is presented with a spectacle to which no other European capital that we can at the moment call to mind furnishes a parallel. If he is a habitual denizen of the metropolis, or a man whose thoughts are too actively engaged to allow of his eyes distracting their course, he will pass it without remark. If he be a foreigner, a stranger, an intelligent child, or a person tormented with an inquiring disposition, he will be struck with the vast array of helpless uglinesses that stand out above the roofs of the houses. On every side, as far as he can see from the lofty viaduct over which he whirls, stretches a forest of abominable forms. No weather-beaten and gnarled thorn-bushes, no pollard willows, no knotted oaks, form so fantastic a group. No storm-driven vessel holds out such intelligible signals of distress. Nowhere is it written in such large letters, "Wanted, an intelligent supervisor."

We speak, of course, of those complex and varied abominations the chimney-pots. Pots, indeed, is a complimentary term. Iron and zinc, brick and terra-cotta, are all pressed into the service. It is enjoined by the religious law of the Jews that if, during the long-continued exits from Palestine, they build houses for residence in any other land, they shall leave a portion of the edifice incomplete, in memory of the desolation of the Temple and Holy City. Not a house is to be seen (for example, from the South-Eastern Railway) which would not fully carry out this injunction. In fact, the chimney appears always to be left in the state of a rudimentary stump, on which smoke-doctors of all grades set forth their wares for display. At times the builder is also a smoke-doctor. Then you see the little brick stump twisted into uncomfortable zigzags. But none the less are these zigzags crowned each with its special pot, or cowl, or smoke-ladder, or abomination of some kind. And one very remarkable feature of the case is that never,—as a rule with few exceptions,—is there any unity, or even harmony, in the terminals of the same house. Every chimney, and every flue in each chimney-stack, has almost invariably its special pot, unlike that which adorns its neighbour, as if it were a necessary means of asserting the individualities of the flue.

This was not always the case in England. We have, in those country localities which have as yet escaped the improvement of modern times, many an example of a chimney which combines the two requisites of utility and of beauty—which are at once striking, and even noble, architectural features, and perfect appliances for thorough warming and ventilation. Great care was bestowed, not more than 200 years ago, on this important feature of the domestic architecture of a cold and variable climate. Bricks were moulded on purpose to build architecturally-designed chimneys. Fret-work, or spiral-work, or lozenge-work, deftly executed in well-cut or well-moulded brick, adorns groups of lofty turrets that, high above the tufted trees, denote the locality of the old hall. There is a fine instance at Chenies, Bucks, the site of the mortuary chapel of the Dukes of Bedford. An old house, once forming a quadrangle, has now sunk into a modest abode for the Duke's steward, with a wing tenanted by cotters. But the long row of chimneys, each standing on a base of its own, and forming so many bold projections from the line of the building, each of the size of a moderate apartment, rise into a pictorial feature that tells of the stately dignity, no less than of the well-considered comfort, that were studied by the architect of the "old house" in Tudor times.

It seems to be the case that it is to the great storm of 1705 that we owe very much of this unfortunate decadence in our domestic architecture. We have been visited during the present winter with storms of unusual fury. To say nothing, here, as to the effect of rain, that of wind has been most formidable. Trees of many centuries' growth have been torn from the earth, upheaving a very mountain of earth with their roots, or torn or twisted branch from branch. In Marlborough Forest alone ninety trees have thus perished. It is not the patriarchs of the forest alone that have suffered. The most remarkable proof of the fury and also of the cyclonic character of the storms that we have noticed, was in the case of a perfectly sound and healthy young holly-tree, a standard in a hedge, that had its head positively wrung off by the wind. But, while slates have flown too thickly to be pleasant, we have not heard much of the fall of chimney-stacks. Few have been left to fall.

When we examine what was the form of the chimney-stack in some of those yet remaining noble country-houses that were built round a central court, we shall the better understand how it has occurred that we have fallen into the unfortunate habit of building our houses, as regards the smoke-flues, inside out, and of thus wasting both fuel and other possible advantages.

Early English houses differ from those in Italy, among other things, by the special character of the chimney. The first step from the simple plan of having louvres in the roof for the escape of smoke rising from an open fire, was to build a stack, or tube, of fireproof materials, under which the fire should be lighted, and through which the smoke should readily escape, without entering the room. At the present day we may see the invention in this, its simplest form. Around the fringes of land taken for conversion into railways, by each deep cutting or lengthened tunnel, few Englishmen can have failed to observe the upspringing of a colony of labourers. Shealings of turf, or shanties of slabs, give snug shelter to many a hardy "navvy,"—the one structural feature of the building being, almost invariably, a brick chimney. In a structure of a little higher pretence, the smith's shop, which is an essential feature of these nomadic villages, the same feature is prominent. The shop itself is usually of the most flimsy and temporary description. The roof may be sheet iron, slate, or even painted canvas. The sides are the roughest and thinnest slabs, put together with a slight overlap. But the hearth, forge, and chimney are of brick, and give a permanent air to the slight shedwork which surrounds them. We have a good illustration of the antiquity of building of this mixed sort, in the fact that the turbary rights, in the New Forest, are attached to chimneys of not less than sixty years old,—a provision that seems to carry back the evidence of the antiquity of this mode of building to the time of William Rufus himself.

As wood became less and less employed for the material of English houses, the use dying out with the discontinuance of projecting stories, and of the picturesque timber mansions yet to be seen in many of our western counties, the chimney still maintained its original independence. It formed a main feature, or group of features, of the house, both in plan and elevation. It was, originally, a square chamber, at the side or end of the main hall and principal apartments, in which the fire was kindled on dogs, from which heat radiated to the larger room, and in the sides and corners of which a snug evening might be passed on the benches which lined the wall. High up towered the stack, ending in an ornamental tube of brick, and so raised as always to insure a sufficient draught. In fact, the whole structure was a tower to some extent independent of the walls of the house.

As architecture sank, economy became more dominant than the decent pride which our ancestors took in rearing their abodes, and sea-coal more and more extensively supplied the place of wood for fuel, the chimney shrank from its normal form of an independent stack into the miserable little square flues which are practised in the outer walls of our rows of houses. But, while shrivelled to an atrophy, the smoke-tube still unfortunately maintained that position, with reference to the plan of the house for which there was a good reason in the case of the old chimney-stacks. The English, of all people in the world, like to go step by step. When an improvement, or at all events an alteration, is effected, it is not our habit to sit down and consider what other alterations ought to accompany it. It thus not unfrequently occurs that positive improvements, introduced without due consideration of all their bearings, involve such counterbalancing disadvantages as to do more harm than good, and either to cause a step backwards in civilisation, or to be, after a short time, thrown aside, from no inherent fault.

Thus, with coal-fires and close grates a smaller chimney became both possible and convenient.

That being the case, the proper thing would have been to study the chimney *de novo*, to investigate the proper size, height, and position of the ventilating apparatus of the new fuel. Nothing of this kind seems to have been done. The historic chimney was allowed to dwindle into a vertical channel too weak to bear its own weight, or to resist the wind for more than a few feet or inches above the shelling roof. It was still left in the outer wall, when its transference to the inside of the building would have been attended by great advantages. And thus, while doing the utmost possible to rob the house of the heat generated by the combustion of a given quantity of coal, it rarely succeeded in averting the nuisance of at least occasional smoke.

To this very day the scientific study, and consequent final determination, of the best form of stove, chimney, and general ventilation for a dwelling-house of any given size, is an unattempted problem. Some architects attain credit and success by retracing their steps as far as possible towards the Tudor chimney. But with the great majority of builders the chimney is one of those unknown and confusing forces the operation of which they fail to predict, as is usually proved by the fantastic variety of cowl, chimney-pot, or tall-boy, that does anything but adorn the sky-line of a house.

It is the more necessary that this question should receive that degree of attention which should remove it from the dominion of the rule of thumb, and bring it under that of definite architectural practice, from the fact that there are, on the one hand, great facilities now placed at the service of the builder which were unknown a quarter of a century ago, and, on the other hand, some of the appliances of our increased luxury are subject to derangements which not only for a time destroy comfort, but often permanently injure health, or even terminate life.

In fact, it must be considered to be nothing short of barbarous to regard, in designing a house, the smoke-flues as mere unimportant issues for the smoke of a given number of fireplaces, and nothing more. Ventilation must, in any architecture worthy of the name, be considered as a domestic requisite of as much importance as illumination itself. Connected with ventilation, or the arrangements for the admission of oxygenated air, whether cold or warm, to the apartments, together with the withdrawal of the air that has become vitiated, either by respiration, by combustion, or by the result of any vital or domestic process, is the important question of water-supply.

We have little doubt, from various distinct reasons, which it would be easy to adduce, that the entire separation from the dwelling-house of every kind of office, is the most sanitary arrangement possible. Such was the case in the time of the blooming beauties whom Reynolds and Romney loved to paint. The most delicate woman would be compelled to face the frosty air, in the old-fashioned arrangements of the country mansion, to the great advantage of her constitution. That has now become rare anywhere, and impossible in towns. We are not proposing to revert to a state of things that has become impracticable although we cannot but intimately connect increased luxury with diminished health. But now that water, led on through pipes, has become an integral part of our domestic economy, at all events in towns, it is no small disgrace to us that the arrangement of these pipes is invariably that which is most certain to bring work to the plumber. The rueful effects of the thaw which succeeds the first sharp frost of a winter seem, year after year, as if they resulted from the operation of some natural and unavoidable law, instead of from our own slovenly neglect. We know that, when the wind is in the north, in certain months, the temperature sinks below freezing point. We know that pipes containing water are burst by frost; and yet we contentedly build, year after year, acres of cisterns fed and connected by miles of pipes, as if frost and burst-pipes were things utterly unknown in England.

Certain precautions might greatly diminish, if not altogether obviate, much of this recurrent disaster, discomfort, and danger. A certain amount of additional outlay, if rendered imperative in the building of every house, would be repaid over and over again by the avoidance of pecuniary cost to the occupant, to say nothing of the avoidance of a cost not to be estimated in money. We may venture to indicate some of the leading principles which no builder ought to neglect.

In the first place, in every house, from the cottage to the palace, the chimney stack or stacks should form a distinct feature of the plan, being one or more hollow towers rising direct from the level of the foundations. There can be no objection to their being so bonded with the walls of the house as to save unnecessary brickwork, but they must be channels complete in themselves, and must contain no timber passing through their walls; and the position of these ventilating towers should, as a rule, be within and not without the house, so as to economise heat.

To every fireplace should be attached a separate smoke-tube, which will be best when it is an earthenware pipe, properly fitted and jointed, and led from the stove to the top of the chimney within the stack, and with no connexion with any other smoke-tube. The proper diameter and minimum length for these smoke-tubes should be decided by experiment, and reduced to a tabular form, as a definite part of architectural theory.

To every fireplace should be provided a communication, on the level of the floor, with the outer air, — thus ensuring a feed-blast for the fire. It will be convenient to attach a damper or shutter to this aperture. In houses of any magnitude, the upcast air may be directed under the floors, to corridors or other spots fit for the admission of a ventilating draught. The waste heat of the kitchen fire, passing into the air-stack at a low level, may thus be made available for warming and ventilating the whole house. The details will depend on the circumstances of the building, but the principle should always be kept in view. Ventilating tubes, or openings from near the ceiling of the apartments, may also form a valuable part of the same system.

All gas-pipes, bell-wires, speaking-tubes, or electric wires may be readily carried from floor to floor through the air-stacks.

The pipes supplying water to the cisterns should also be brought through the air-stacks, care being taken, wherever the system of water-supply is at all complicated, to form such connexions as shall insure a circulation of water below the freezing-point. The hot-water apparatus, warmed by the kitchen fire, and supplying baths on the bedroom-floor, which is now much employed, ought in the same way to be connected with the air-stack. Of course, proper arches should be turned at the bottom of the stack, and where the pipes are led out, closed with a slate or stone slab, so as to give access in case of need.

The details of such a plan as the above are for the decision of individual architects; but as to the importance of the principle, as regards health, comfort, saving of expense, and absence of annoyance, there can, we think, be no doubt. In our present state of civilisation, with the horror entertained by many people of draughts, and with the improved and almost air-tight closing of doors and windows, that is effected by the employment of seasoned wood and good workmanship, it has become absolutely necessary to provide for efficient ventilation. The air-passages and water-conduits that are required for our present mode of life can no more be neglected or omitted with safety than the respiratory and circulating channels of the animal frame can be injured with impunity. There is something more than mere analogy between the two systems. The home of the body must be cared for as a protection for that which is the home of the soul, and it is only by foresight that this can be done. A small extra outlay, in the first instance, wisely directed to meet the inevitable demands for air, fire, and water, will be repaid by the durability, as well as by the healthy and comfortable character of the building; nor can there be any doubt that, when the system once receives the attention which it requires, the demand for properly-ventilated and chimneyed houses will be such as to leave those in which these requirements are neglected the last to find tenants or purchasers.

Increase of Salary to Surveyor of St. George the Martyr's Vestry.—The local Roads Committee recommended that from and after January 25th the salary of the surveyor be paid at the rate of 250*l.* per annum. The chairman, in moving its adoption, said that with the amount of work done, and the way in which it had been carried out, he certainly thought they would not be doing wrong in making the proposed increase. The motion was unanimously carried.

EXCAVATION OF THE ROMAN FORUM.

EVER since, at the beginning of this century, the antiquarian interest in the remains of ancient Rome first awoke to any great extent, the different Governments of the day have considered it a moral obligation to assist more or less the work of excavation. The present Government has granted an annual subvention of 100,000 francs, and splendid results have crowned the work under the direction of Signor Rosa. No part of the old city has occupied more attention and labour than the Forum, formerly the busiest, now the quietest, part within the walls. What was in classic times the proudest quarter of the metropolis, the present century found a pasturage for cattle and the undisputed playground of Roman children. The French Government of that time first began to lay bare those remains of architecture on the slopes of the Capitoline Hill, which had stood in direct connexion with the Forum, and which surrounded the latter part of the "Via Sacra" leading from the Forum to the Temple of the Capitoline Jupiter. Nothing could then be done for the excavation of the Forum, and it was left to the generosity and antiquarian interest of a highly-cultivated Englishwoman, the Duchess of Somerset, to establish the meaning of that column, standing singly like a riddle, erected in honour of Phocas, as the inscription proved. On this occasion, those large regular tufa slabs were met with which form the pavement of the Forum, while the neighbouring streets are paved with polygonal basalt blocks. Along the edge of the travertine pavement, which was three steps higher than the roadway, compact blocks of masonry, partly well preserved, were found, which seem to have served as bases for columns or statues. If the explorations had at that time been continued, it would have been possible then to establish what we now know, that this row of bases formed the southern limit of the Forum. As the excavation of the single column had led to such remarkable results, the Papal Government resolved to continue explorations near the three marble columns, the architraves of which were partly preserved, visible in the direction of the Palatine. Without much trouble it was established that they belonged to a temple, since proved to have been dedicated to Castor and Pollux; the greater part of the stairs was also laid bare, which led from the hall of the Temple to the street. But the considerable sums spent by the Papal authorities, especially in 1829 and 1830, for the conservation and laying open of antique buildings,—for instance, of the Colosseum,—contributed little towards the excavation of the Forum, though all the different Governments which Rome has seen since the beginning of this century willingly contributed to the attainment of that object. Even the Republican interregnum of 1848 at least prepared a decree ordering the complete excavation of the Forum. But no former Government finished the work, an essential step forward in this direction being only lately made under the present Government. The much-disputed question of the area of the Roman Forum, of which no classic writer gives clear indication, has at last been brought a step nearer its solution. The length of the south side, from which that of the other probably differs very little, is, according to Canina, about 95 mètres. Although the length of the Forum is thus approximately fixed, this cannot be said of its breadth, and considerable difficulties will have to be overcome before the whole area is laid bare. The works have not up till now come into conflict with the traffic of the modern city; on the western side alone a small part being covered by a street. A difficulty arises as to the northern limit of the Forum. This crosses under a very much frequented street, not easily to be diverted. It leads, as proved by passages from classic writers, as well as by modern inquiries, in a straight line from the Arch of Septimius Severus, in the direction of the Temple of Faustina, opposite the Temple of Castor, and was formed by the same "Via Sacra," one end of which we met with already at the Capitoline Hill. One part of this road, recognisable by its basalt pavement, is seen under the arch itself. It was brought to light before near the Temple of Faustina, and its existence, about midway, in a straight direction, has also been established. Everything, therefore, points to the conclusion that the limits of the Forum are formed by a line which, beginning at the left wing of the Arch of Septimius, extends as far as the corner of the Column of Phocas, turns here to the east, and, skirting the basements, reaches the corner which lies opposite to the

steps of the Temple of Castor and Pollux; then, touching the street lately laid open, leads at a right angle to the "Via Sacra," which latter reaches the beginning of the boundary-line again at Septimius's Arch. It is a little space which is enclosed by these lines. According to measurements the Forum is 63 mètres broad on its western side. This would give, therefore an area of 5,985 square mètres if the space were everywhere rectangular; but this is not the case,—the longer sides converge towards the east, and we may therefore take the area of the Forum as about 5,000 square mètres. It will be asked, how is it possible that such a small place sufficed for the Roman people? In answering this, we must take into consideration that the place was selected and formed at a time when the later greatness of the city was never thought of, and when it was found, already in the last century before the Christian era, that it was becoming too small for all the business transacted there; commerce, and after that the juridical part of the Roman public life, were moved from it. In the place of private houses, those basilicæ were erected, of which one, the Julian Basilica, built by Cæsar, extending along the whole length of the Forum, has been laid open. The works in the Forum are progressing steadily, though with a more limited supply of labour than last winter. About one-third of the whole mass of earth, accumulated during centuries, and from 7 mètres to 12 mètres thick, has been removed. Much has been accomplished, but more remains to be done. The harvest of sculptures, as well as of important inscriptions, has been inconsiderable. This was to be expected; for no other part of the old city has been so open to explorers, and none has been so often rummaged as this. In September of last year, however, a valuable find, to which we have already alluded, was made. This is the now well-known marble bas-reliefs, found near the corner where rises a Middle-Age tower. At two different portions of this tower, to which they appear to have served as supports, hidden by other materials, is now disclosed a row of portions of wall, occupying from 12 mètres to 15 mètres, decked on both sides with costly sculptures, which have apparently served for the decoration of the rostrum. The reliefs would display to the eyes of the people standing below an historically-arranged series of notable events having relation to the Forum. The position in which they have been found opens a fresh field to topographical conjecture and inquiry; whilst the reliefs themselves are of the greatest importance, not only on account of their historical import, but on account of the brilliant quality of their execution, which appears to belong to the last bright epoch of Greek art in Rome. The reliefs are to be exhibited at the forthcoming Vienna Exhibition.

In connexion with this subject may be mentioned, that within the last few days a tomb, of very beautiful architecture, has been discovered at the Villa Casalli, near the Appian Way. It consists of three chambers containing four coffins, of white marble, decorated with sculptures. The latter represent, in relief, the Muses, Bacchus, and Ariadne; a hunt of wild beasts; and the door of a sepulchre. It is assumed that one of the Muses, whose head is decorated with flowers, represents one of the deceased persons whose remains are here entombed. The sepulchre bears the inscription, "TITVS OLIVS NIKEPHORVS." The letters, the style of the sculptures, and other details, place the tomb in the time of Septimius Severus. The hair of one of the female figures is arranged in the characteristic fashion of Julia Mammæa, in the form of a diadem, with high forehead.

"ARCHITECTURAL DETAILS IN COMMON USE."

Under this title Mr. E. T. Owen is reading some papers to the Architectural Association of Ireland. In the course of the first, the reader said the use of iron, however manufactured, has of late years taken a prominent place in many buildings, and of course is admitted to be a most important material, and is perhaps destined to become still more important in future architectural works; but I at present do not believe that, as a purely architectural material, it has been fairly dealt with. But, like many other useful things, it can and does help the architect and builder over many important difficulties, which might otherwise cost a little more money. But in really good architecture, whether costly or otherwise, there are certain situations and conditions in and under which it should not be admitted. I know a building (not in Ireland, by the way) the construction of which will be sufficient to serve as an illustration of the use, and also of the abuse, of that material. In the building alluded to there are four stories, exclusive of the ground story, which is a lofty one, resting on an iron girder, supported in its turn by a series of thin metal columns; and the space beneath is equal to fully one-half of the whole ground floor, and this covered space is used by large numbers of persons every day; and what I think objectionable is this,—to say nothing of the general construction,—that these columns, girders, &c., are all carefully concealed, and boxed up in such a way that no possibility is afforded of getting at them, should any contingency arise requiring their examination, without considerable and unnecessary expense; for they are made to assume, by dint of bracketings, boxings, and any amount of plaster, &c., the proportions and external appearance of an elaborate and full-blown order in one of the richest of the Classic styles, so as to have quite a presentable appearance. Now, I will not only venture to say that this mode of treating materials is not to be recommended, being anything but true architecture. But I will go further, and say that it is to be positively avoided as dangerous, although the danger may appear remote; and I fancy that, did the human beings frequenting that building know anything of construction, and happen to think of the Chicago or any of the great fires of late years, their placid endurance of such things would come to an end. It is the architect's duty, as best he may, to disabuse the public mind of its tendency to obtain too much of him, under the mistaken idea of economy.

Similar objections might justly be raised with regard to street architecture, so called, in our large cities, where we see story after story piled one over another, apparently in "mid-air"; but we, the experts in such matters, know better; for we have observed that they are carried upon refined and sometimes very elegant castings, like bamboo canes, placed a little to the rear of the glass or other equally fragile front. Now, all that business and common sense require can be obtained without this; and being architecturally bad and dangerous into the bargain, we should set our faces against such temptations, without fear, even although we know it to be possible that Mr. So-and-so will get his builder to do what his architect would not (I mean no offence to the builders, though).

If, however, cases should arise in which such a mode of construction is resorted to under special circumstances, when heavy masses may have to be carried over space, in no instance should the iron beams or other medium of support be so situated as to be concealed or difficult of access; but I would recommend as preferable, in the majority of cases, the retaining of the unmistakable, though somewhat antiquated, brick or stone vault, arch and pier, without forgetting the old and honest timber-work, whether in the roof, truss, framed partition, or simple beam, as things less likely at times to overwhelm us with sudden destruction, than some of their more modern competitors, which after all give one the idea of clever architectural gymnastics,—a mountebank on stilts, looking very extraordinary, but at the same time showing a rather undesirable method of progression. In a former paper, it was my intention to go into the subject of roof construction, but time, then as now, would not admit of my devoting sufficient care to that important requirement of almost every kind of building, because drawings of each kind ought to illustrate such a paper; but I will endeavour to give a hint or two, if you will accept it as such, for consideration. I suppose I may imagine that we have done with the vault or dome, in old-fashioned materials at least, for all future time, and that we must confine ourselves to timber, iron, &c., and perhaps concrete. Now, I think a great respect should be given to timber, because ideas in that material are not even yet exhausted. The ugly, but serviceable and common tie-beam—whether king, queen, or a combination of both—is familiar to each of us, as is also the hammer-beam, and the varied forms found in old works, in many of which the effort to get rid of the horizontal beam without waste of material is evident. Now, whilst respecting all, whether ancient or modern, for the useful suggestions they may contain, we should try to make intelligent progress from the apparent success or comparative want of it which the various kinds present, by studying the circumstances which appear to govern each particular case, rejecting what is not now necessary either in quantity or quality of materials, or the principle of construction adopted, provided always that we are quite sure that the conditions by which we may be governed are so far in advance that we can honestly lay claim to better things. A very flat-pitched roof requires very different treatment to a steep one, yet you will sometimes see that the latter has equally heavy timbers to the former, which is unnecessary, the spans being supposed to be the same,—the transverse strain being so much greater in the one case than the other. Both kinds have their legitimate place, but I can see no good reason for the unwholesome fear of showing the outside of a good high-pitched roof, provided it keeps out the weather better than the flat one—at least, in this country,—and you make the interior of it to some extent available, which can almost always be done. Neither should architects, I think, be so very much afraid of varying the angle of the pitch of roofs in the same building for the sake of symmetry only, when leading conditions point out that it would be an advantage to have it otherwise. At the same time, liberty must not become licence, irrespective of sound and lasting construction; and we must therefore endure a certain restraint in the consideration of the proper points of bearing, thrust, and support. The abominably ugly and wasteful roofs put up of late years, are a disgrace to the generation, and especially so as the same amount of material and labour would, if properly used, have made them fitting and pleasing accessories to the general composition of which they form a part; but I suppose that in the "good old times" the architect was partly his own builder, and in some cases quite his own client, and that stocks and shares, and everything except pious contributions to the good work, were then unknown. Concrete and similar compositions may tend somewhat to modify the more ordinary and unpretending class of buildings, and perhaps take a more important place than it now does, in an architectural sense; but it has not yet stood the test of time, or other trials to which all kinds of buildings are more or less liable, and therefore it should be employed with due caution: for instance, it would not probably be the best material for a work required to withstand intense heat, although it might resist the weather for ages; and whilst it is well adapted to the formation of a level, strong, and inexpensive floor, it might not prove a good thing in connexion with a lime or malt kiln, or even a baker's oven. Perhaps a good deal more may be done than has hitherto been by using concrete in combination with other materials, not only as grouting similar to what we see in old Roman works, but in courses and blocks forming important parts of a structure. We must be content, however, to move cautiously, testing every new invention as we go.

THE RIGHTS AND WRONGS OF ARCHITECTS' ASSISTANTS.

A gentleman, who calls himself a Superior Assistant, has favoured us, in a badly-written letter, with the information that he was employed, on his own terms, to assist an architect in the preparation of drawings for a recent competition, and that he executed, in fact, the greater part of the work; and he calls upon us, somewhat noisily, to make public his name, and to claim for him the credit of being the real author of the resulting design. We learn further from his letter that he was paid all he charged—was, in fact, treated with very great kindness and confidence by his employer; that giving such assistance is his mode of livelihood at present; and that he is already at work in another office affording temporary aid.

It ought to be unnecessary to say that we decline compliance with his request. If we did state his name, it would be to gibbet it for the benefit of others. Unless our notions of right and wrong have become sadly old-fashioned, his conduct, as stated by himself, will be viewed by every honourable mind with feelings the reverse of flattering.

Judging from parts of this "superior assistant's" communication, we doubt altogether his ability to make the design to which he refers, however much he may have contributed to it, under the control and direction of his employer. But supposing that he had done so, the case would remain precisely the same. He offered

certain assistance for a certain salary, and was paid it fully and fairly. There was no arrangement that he was to be personally identified with the work, or in any way responsible hereafter: there was the universally-accepted understanding to the contrary; and in seeking to break this he takes a step towards the destruction of confidence calculated to do the most serious injury to the rising members of the profession, many of whom find it absolutely necessary, both on financial grounds and for the sake of acquiring knowledge and experience, to seek employment with architects in actual practice.

It will be a bad thing for the friendless aspirant, when the established and prosperous architect has been taught to fear that his share in the production of designs sent out in his name will be weighed and measured and published by those he has paid and instructed to assist him.

This matter is the more *apropos* just now in consequence of the attack recently made on Mr. Ross, of Inverness, who submitted an able design for the proposed cathedral in Edinburgh. Of Mr. Ross personally we know nothing whatever,—we never saw him, so far as we are aware; but we do not hesitate, in the interest of justice and decency, and a regard for the best interests of the profession, to say that a more scandalous endeavour to ruin a professional man was never made by professional brothers. It has, in fact, so much the aspect of a conspiracy; the in and out workings in it of one or two hands are so obvious, that an acute lawyer, properly instructed, would probably considerably astonish those who have been guilty of the outrage.

As to a letter published by the assistant employed by Mr. Ross, Mr. G. F. Roper, setting forth that he made the design, and not his employer, we will simply say that we regard it as a breach of confidence which will probably do the writer all the harm that he evidently feels it ought to do him.

NEW BUILDINGS IN WELLINGTON-STREET, COVENT GARDEN.

DURING the last few months, the neighbourhood of Wellington-street, Covent Garden, has been undergoing some considerable improvements by the erection of new buildings. Prominent amongst them are the large and commodious premises at the corner of Tavistock-street and Wellington-street, for Messrs. Findlater & Co., which are now almost finished, and the new Covent Garden flower-market adjoining, the Wellington-street elevation of which has only just been finally completed. The first-named premises are exceptionally lofty as compared with the rest of the buildings in the immediate locality. The height of the building is 62 ft. from the street level, and the width of the Wellington-street and Tavistock-street elevations (which are uniform), 50 ft. each, whilst at the angle of the two streets there is a third and prominent frontage, which contains the main entrance to the premises. In addition to the basement and ground floor the building is four stories in height. The ground plinths all round, up to a little above the street level, are of granite, whilst the main body of the building is of white brick, with Portland cement dressings. The ground-floor has three wide segment-headed windows in the Wellington-street and Tavistock-street elevations respectively, whilst the four stories above have four windows each. The architect of the building is Mr. V. Gore, and Messrs. Cubitt are the contractors.

The elevation of the Covent Garden flower-market is about 45 ft. in height and 50 ft. in width. The materials used are white brick with Portland stone window frames, cornice, and balustrade, the whole enriched with terra-cotta decorations. There are two spacious entrances 9 ft. each in width, with arched headings, with a window of similar character in the centre. On each side of the window there are stone piers, recessed arches in terra cotta, springing from them over the window and the two entrances. Above these arches a terra-cotta moulding is carried across the elevation. Over this, again, corbels in terra cotta support a cornice of Portland stone, the elevation, which as a whole is bold and effective, being surmounted by a balustrade, also of Portland stone. This building has been erected from the designs of Mr. Rogers, Messrs. Cubitt being the contractors, as well as for the building adjoining.

METROPOLITAN CONSTANT WATER-SUPPLY.

AT the last week's Metropolitan Board of Works Meeting, the Works and General Purposes Committee presented a report upon the regulations made pursuant to the provisions of the Metropolitan Water Act, 1871. The committee were of opinion that the Board should not take any steps at present with a view of giving notice for a constant supply of water in any of the districts of London. They recommended that the subject be referred back to them, with authority to represent to her Majesty's Government the imperfect state of the law, and the necessity for new legislation on the subject. The motion was adopted.

At the last meeting of the St. George-the-Martyr (Southwark) Vestry a resolution was adopted, declaring the rules for a constant water supply to be unnecessarily stringent, arbitrary, and enormously expensive.

Colonel Beresford has given notice in the House of Commons that on March 7th he will call attention to the necessity for a constant supply of water being given throughout the metropolis, and will move for a Select Committee on the subject.

THE METROPOLITAN GAS SUPPLY.

IN consequence of the defective quality of the gas supplied by the Phœnix Company to Battersea and that neighbourhood, the Wandsworth District Board of Works have resolved to bring the subject under the notice of the company with a view to secure an improvement in the illuminating power of the gas supplied to the street lamps.

Notice, says the *Daily Chronicle*, having been given to the Marylebone Vestry by the Imperial Gas Company of their wish to terminate the present contract for the supply of gas, the former asked for the definite decision of the company by the 1st of February. A reply was received in which the company state that it is impossible for them to give any information at present as to whether they will raise the price of gas or not. They will shortly have to enter into a contract for the supply of 400,000 tons of coals, the price per ton being 33s. as against 18s., the present contract price; but they hope that a favourable turn in the coal market will come before they are compelled to enter into the contract, and enable them to continue the supply of gas at existing prices.

DESIGNS FOR MOUNTAIN CHAPELS.

OUR readers may remember that at the annual meeting of the Carlisle Diocesan Church Extension Society, last August, the Bishop of Carlisle referred to the tendency to pull down the mountain chapels in his diocese, and rebuild them in a fashion which did not quite suit the scenery in which they were placed. The Bishop expressed a wish to have something like a model design for a mountain chapel,—"something of a solid and solemn character, which would seem to tone and harmonise with the mountain solitudes in which they were placed." Mr. Schneider took up the suggestion, and offered 20 guineas as a premium for the most suitable design, and a second premium was also offered. The matter was placed in the hands of the Central Committee, who, at their next meeting, directed the secretaries to advertise the scheme, confining the competition to Cumberland, Westmoreland, and Lancashire. About fifty sets of plans have been sent in to the committee, and are now being exhibited. The *Carlisle Journal* says,—"They are naturally and necessarily of a very various character, and the contrasts in men's minds of ideas formed on certain stated grounds are somewhat amusing. The bishop asked for something 'solid and solemn.' Some architects have met the bishop's demand by offering light, airy, and exceedingly pretty structures, but infinitely more fitted for the quiet of a fashionable square in a large town than to encounter the rude blasts among our Cumberland mountains. Others seem to entertain the opinion that there is nothing more 'solid and solemn' than an old barn, and accordingly adhere as rigidly as possible to that model,—of which there are already too many copies in Cumberland dales. Others, again, there are with which we must express much satisfaction. They are substantial, do not lack a certain massive kind of elegance in real keeping with the design, and are relieved from tameness by Gothic porches, strong buttresses, and pointed gables. The design which to our mind is most faithfully described by the bishop's words is that signed 'Vivo in spe.' This is a picturesque little chapel, bold and effective, with strong tower and spire, neither of which is without beauty, well buttressed, and wearing a general air of substantiality. The design of 'Ilex,' too, is very pleasing to the eye in its general features, though somewhat wanting in simplicity, and in some respects perhaps too ornate; but it contains the elements of success, and, with slight modifications, might be rendered very suitable."

HEREFORD.

THE borderers of England, whether on the north or on the west, were bold, hardy, and aggressive races of men, having for their patrimony the moor and the morass, the wild, bleak upland which occurs on the Scottish frontier, or the steep crags and rugged defiles which gave strength and, in ordinary cases, impunity to the Welsh. The Scots, indeed, came of the same stock with the English, and had recently formed a part of the same kingdom, under the same lords; nor was the land immediately south of the Tyne or the Tweed materially richer than that to its immediate north. But the Welsh had other more potent and better causes for their continual and ferocious transgressions. They were the earlier possessors of the whole country,—a possession still attested by the hills and rivers, and, indeed, by the names of many of the chief cities of England. They were of an entirely different blood and language from either Saxon or Norman: by the one they had been gradually driven into the western and less-fertile tracts of the island, and the other held them cooped up and at bay within their mountain fastnesses, and responded to their continual partisan warfare by occasional invasions on a large and, for the time, irresistible scale.

Full in view of the Welsh mountains were spread out some of the most fertile lands in Britain,—cultivated, inhabited, and fortified by the invaders, who, not content with the slopes of the Cotteswold and the velvet meads on the left bank of the Severn, had pushed their conquests far beyond the right bank, holding the stately ridge of Malvern and the rich pastures of the Teme, the Lug, the Frome, the Worm, and the Wye, even up to the Dyke of Offa. That dyke, still to be traced along much of its length, was felt to be a perpetual mark of inferiority, an abiding affront to the patriotic feelings of every Welshman between the estuaries of the Severn and the Dee. No marvel, then, that the Welsh were ever insurgent, ever breaking forth with fire and sword into the English territory, and especially into the most rich and, by nature, least-protected tract of it, the fair county of Hereford.

Herefordshire was first subjugated by the Romans. Three miles north of the city are the remains of a camp, probably Roman, covering about 30 acres of ground, and now known as Sutton Walls, a little south of which runs the line of the road which led to the Roman town of Magna Castra, four miles to the west, and was continued onward in the same direction.

At what precise period Herefordshire passed under the Saxon yoke, and became annexed to Mercia, is unknown,—probably under Orida, early in the seventh century. The see was founded in 680, when a synod was held here under Putta, the first bishop. Sutton or Southton, so called from its position close south of the Roman camp to which it has given its name, was at a very early period a residence of the Mercian kings. Here, in the middle of the eighth century, resided the celebrated Offa, probably during the construction of his dyke, which passes about six miles to the west; and here in 794 was committed the murder of Ethelbert, his intended son-in-law, a deed which led to the aggrandisement of the cathedral church, to which his penitential donations were largely paid. A charter of King Cœnulf, A.D. 799, mentions Hereford, as do others by Deneberht, in 802 and 803, the last recording certain "*monasteria quæ olim in antiquis dictis ad Herefordensem ecclesiam præstita fuerunt.*" Sutton continued a Mercian palace until the union of the seven kingdoms, under Egbert of Wessex, in 827.

Edward the Elder, a great constructor of strong places, who repaired the citadel and walls

of Chester in 909, is said by Grafton also to have fortified Hereford, erecting a strong castle there. His sister Ethelfleda, a still greater castle-builder than he, and to whom are due the mounds of Tutbury, Tamworth, Leicester, and some others, was the widow of Ethelred, Duke of Mercia, in 915, when the Danes had advanced by the Wye, and taken captive the Bishop of Archenfield. She attacked and defeated them before Hereford, no doubt making use of the new defences. She died shortly afterwards.

Early in the eleventh century, the Saxon sway had been so far extended as to have left the Dyke behind, and Wales was regarded as a part of England, and an attempt made to force it to contribute to the common tax for the defence of the island against the Danes. For this purpose Edwin, the Ealderman of the Mercians, led an army as far as St. David's, punishing the people for their refusal. At that period, and during the reign of the Confessor, the Welsh were led by Griffith-ap-Llewelyn, the ablest of their princes, and, indeed, the only one who ever held the Welsh together, or gave the English cause for anything like serious apprehension. Aided sometimes by the Danes from Ireland, sometimes by traitorous Saxon chiefs, and sometimes even by the discontented Normans, he is found during the first half of the eleventh century waging on the whole a successful war against Herefordshire. It is certain, from the number, magnitude, and character of the existing earthworks, that Irchen or Archenfield, called from its beech-trees "Trefawrth," by the Welsh, and sometimes by the English, "Fernley," had from a very early period been inhabited by the English; but either distrusting these, or because he wished to quarter afar off the visitors whom he attracted, but of whom he was afraid, the Confessor made large grants of land along this district to his Norman courtiers, with whom, therefore, Griffith had not unfrequently to deal.

The earliest of these grants seems to have been made to Richard Fitz-Scrob, whose fortress, built after a fashion till then unknown in England, gave great and general offence. His original castle has been replaced by later structures, now also in ruin, but the earthworks are probably original; and the name of Richard's Castle shows how deeply the fear of its builders was impressed upon the people; and it is, moreover, a very rare example of a parish bearing a purely Norman name.

These grants were opposed by Earl Godwin and his sons, and it was to enforce his remonstrances against them that the English Thane led a force from Beverstone, and challenged the Confessor to give up his stranger favourites,—a struggle which finally ended in the temporary banishment of that truly English earl.

In 1052, during Godwin's exile, Griffith invaded Herefordshire, and advanced as far as Leominster before Fitz-Scrob and his Normans were in the field to meet him. They were beaten in a pitched battle, and upon open ground.

In 1055, the earldom of Hereford was in the hands of Ralph, surnamed "the Timid." Griffith, uniting with Ælfgar, the Saxon lord of the East Angles, who was accompanied by an Irish force, burst into Archenfield, and again laid waste the border. Two miles from Hereford Griffith and Ælfgar were met by Earl Ralph, who seems, with the Norman contempt for infantry, to have placed undue weight upon his cavalry, the result of which was a complete defeat. Griffith entered Hereford, which was undefended, sacked and burnt the city, treated the cathedral and the clergy with excessive severity, and destroyed what the "Brut" calls the gaer, that is, the castrum or fort. The account seems to imply that the city was not then fortified. Mr. Freeman thinks the gaer was a work of masonry. However that may be, there is little doubt but that it was a work on the site of the later castle, for by the river-side, for defence, it would certainly be placed; and as the position of the cathedral has doubtless always been the same, there would scarcely be room for a fortress between its precincts and the western marsh. The position of the bridge, too, is probably ancient, and this would lead into the city, not into the gaer. The appearances of the earthworks, as they existed before the removal of the mound and the filling up of its proper ditch, much resembled those of Tamworth, and other works attributed to Edward and Ethelfleda, and the gaer may well have been of that date, so far as the earthworks were concerned. This inroad of the Welsh in 1055 was the most severe and the most lasting in its effects of any on record. All Archenfield suffered, and traces of the spoiler are recorded long afterwards in Domesday.

Although Godwin's return from banishment in 1052 had been followed by the putting forth of most of the Norman intruders, Richard Fitz-Scrob, one of the most offensive, seems to have remained, and long afterwards to have put down Edric the Wild; and his son Osbern, after a short exile in Scotland, came back to Herefordshire, and held office and dignities both before and after the Conquest.

In 1055 Godwin was dead, and to Harold, as Earl of the West Saxons, it belonged to redeem the disgrace incurred by Ralph the Timid. He lost no time in preparation. In the course of the same year he mustered his forces at Gloucester, and by his mere presence cleared Hereford of the Welsh and Ælfgar. He at once fortified Hereford. Whether he restored the castle is unknown, but he surrounded the city with a wall, no doubt along the line of the later structure. Mr. Freeman supposes Harold's work to have been a mere "dyke of earth and loose stones," or as Florence of Worcester describes it, "*Vallum latum et altum.*" Domesday, however, records a "murus" at Hereford, as having stood in the time of the Confessor, so that Harold, when Hereford came under his immediate government, may, as Mr. Freeman suggests, have replaced his vallum with a wall of masonry. Harold's defences probably did not include the suburb, which even then must have existed, since we read in Domesday of Burghers within and Burghers without the walls; though the latter would derive a not incomplete protection from the broad belt of marsh which then surrounded the city.

Griffith had sought and received terms of peace. Nevertheless it did not suit him to allow Hereford to become a strong post. Early in 1056 he again crossed the border. He was opposed by Leofgar, the new bishop, who, however, was slain in the first combat. His successor, Ealdred—a man of equal determination with better fortune,—held the Welsh in check, and negotiated a peace, and the fortifications of Hereford were completed.

In 1062 Griffith again appears upon the scene. Probably he traversed Herefordshire, for he crossed the Severn in the diocese of Worcester. On this occasion Harold,—appearing not as the defender of this or that province, but of the whole kingdom,—executed a counter movement, and invaded North Wales. This was followed in 1863 by Harold's great invasion, in which Griffith was murdered by his own countrymen, and Wales submitted, having deprived herself of her greatest son. It was at the conclusion of this war that Harold employed himself in constructing a sort of hunting-lodge for his sovereign in the low lands of Gwent, at Portskewet, where earthworks are still seen. The lodge was attacked and destroyed while in progress by Caradoc-ap-Griffith-ap-Rhydderch, of South Wales.

Hereford played no part in the Conquest; but the city and shire occupy a respectable place in the Domesday Survey, where the customs are related in great detail. The king had six moneyers there, and the bishop one. Of the city burgesses 103 held of the king, and 27 had held of Earl Harold. All the tenants of the burgh were liable to military service against the Welsh.

The customs called of the Welsh in King Edward's land in Arcenefeld, or Irchenfield, also there recorded, are curious, and show not only the early existence of a local militia to resist the Welsh, but that the people were mostly of Welsh blood, and were employed against their countrymen. The King held three churches there, and the priests of them were to be the King's legates or ambassadors in Wales, and when the army marched against an enemy, to the men of Archenfield was committed the post of trust and danger. During the advance they were to form the "Auantwarde," and in retreat the "Redrewarde."

Such, then, having been the antecedents of Herefordshire, it is not to be wondered at that it was bristled with strong places, nearly all of which show indications of early dates, and in many may be traced the mount, or motte, which in England there is strong reason to regard as in favour in the tenth century. Domesday, usually so silent as to fortresses, and enumerating only forty-nine in all England, mentions in this county eight, and two strong houses. There were, however, many more, and at this day there remain traces more or less considerable of twenty-eight, of which many preserve the mount, and others earthworks of an early character. Similar works are found at Brecon and Builth, places known to have been held by the English at an early period. No doubt, these strongholds, originally strengthened with timber, were burned again and again by the insurgent Welsh; but the positions of most of them were well chosen, and each had its surrounding estate, so that when, after the conquest, the great Norman barons marched into Wales, they constructed upon these sites castles of masonry after their fashion, of which a few remain, though many, having been destroyed, have been rebuilt in the reign of Henry III., or later.

William's arrival no doubt confirmed and extended any local power that may have been allowed to Richard Fitz-Scrob and his son, under Harold. Osborn, as sheriff, held Hereford, and either he or the first Norman earl probably rebuilt the castle in the Norman manner.

William FitzOsborn, the great Norman chief, "*Magister militum bellicosus,*" Earl of Hereford from 1067 to 1071, was a fearful scourge of the Welsh, whom he drove back and vanquished on the banks of the distant Rhymny. To him are attributed the castles of Strignil, Clifford, Wigmore, and Ewias,—that is, the Norman part of them, for some at least preserve older earthworks.

Roger de Bretuil, William's third son, succeeded him in the earldom. He plays no part in the history of shire or castle. Failing in rebellion in the eastern counties, he ended his days in prison.

When Bretuil died is unknown, but in 1138 Hereford, commanded by Wm. Talbot, held out successfully against Stephen, during a long siege. In this he was much aided by Milo, the constable of England, who received the earldom of Hereford from Maud in 1140, and it remained in his family till the end of the century. Milo's patent gave him the moat, probably the "motte," and all the castle. As earl, however, he was less fortunate. Stephen returned and took the castle, and wore his crown in state in the cathedral.

Roger, son of Milo, was in opposition to Henry II., but escaped by the wise counsels of Foliot, the bishop. In the reign of John a less discreet, or bolder prelate, Giles, Baron de Braose, united with Llewelyn; but, failing to bring over the men of Hereford to support him, died in exile. The castle seems then to have fallen into the possession of the Crown, and so to have remained. Prince John gave the custody of it to Roger Bigod, and in the sixth of his reign as king, and in the 7th of Hen. III., William, brother to Thomas, Lord Cantelupe, and sheriff, was also governor. The turbulent reign of Henry III. gave value to the castle of Hereford. 15 Hen. III., John Fitz-Terrick and Wm. de Stowe, surveyors of works at Hereford Castle, were allowed 20*l.* for repairing the walls. 16 Hen. III., Terrick and Roger Carlton were surveyors of mangonels and petards within the castle. 26 Hen. III., John and Roger le Werrur were surveyors, and had spent 7*l.* 8*s.* 6½*d.* on artillery, and 12*l.* 1*s.* 4*d.* in making a trebuchet called "Blythe," and 40*l.* 14*s.* 4*d.* in building a tower in the castle. 42 Hen. III., the castle was in the hands of the sheriff, Hy. de Pembridge, until the barons forced the king to appoint John de Grey.

44 Hen. III., Roger Mortimer was governor, and penetrated into Wales as far as Builth. He was, however, in turn attacked, and held the castle, though for a few weeks only, against Simon de Montford and Prince Llewelyn. Bishop Acqua Blanca was taken and imprisoned at Eardesley. Peter de Montford, the earl's son, had charge of the county, and employed the issues of the former in the repairs of the latter. After the battle of Lewes, Prince Edward was a prisoner here.

Edward's escape hence has often been related. Widemarsh, whence he galloped off, still bears that name, and lies about a mile north of the city.

During the whole of this time, from 1199, the title of Earl of Hereford had been borne by Henry de Bohun, whose mother was a coheir of a previous earl, but neither he nor his celebrated descendants, Earls of Hereford and Essex, although they held Huntington Castle and the lordship of Brecknock, and built the Castle of Caldecot, ever seem to have been seized of that of Hereford, which remained in the Crown.

Soon after the time of Edward's flight, John le Werrur and Wm. Valet were surveyors of works for the king, at Hereford, and charged 45*l.* 6*s.* 10½*d.* for repairs of the walls and of the king's houses. Wm. Capon also held lands at Marden, by the serjeantry of keeping the door of the castle, and this, under Hen. III., was commuted into military service.

Possibly the castle was employed as a local

treasury for 1 Edward I. Henry Pigot held 46 acres *in capite* by the tenure of transporting the king's treasure from Hereford Castle to London. In the same year Richard Porter and Richard le Panner, surveyors, charged 21*l.* 1s. 6d. for expenses and repairs of the king's house in the castle, and in the next year they had fifteen oaks from the king's forest of Haywood, a mile south-west of the city, allowed for repairs.

2 Ed. I., Giles Berkeley, sheriff, had spent 4*l.* 15s. in repairs, and in 7-8 Ed. I. Roger Burghull, his successor, had spent 2*l.* 5s. 4d. Hugh Turberville, one of a very unruly race, had, it appeared, when sheriff, burnt and destroyed in the castle the king's house, and certain engines of war and military stores, to the value of 100*l.* For this he had a pardon, 5 Nov., 48 Hen. III., but the debt remained, and, 9 Ed. I., the sheriff was ordered to distrain upon his goods.

12 Ed. I., a new chapel was erected in the castle, and the barons of the exchequer, by the king's precept, allowed Roger de Burghull 10*l.* 6s. 8d. on that account. 15 Ed. I., Henry de Solers, a Herefordshire man, had charge of the castle, with arms and stores. 32 Ed. I., Miles Pychard charged 40 marks for repairs, which were disallowed because not certified by the surveyor. John de Acton was governor, 33 Ed. I.

1 Ed. II., Alan Plukenet, keeper of the king's forest of Haywood, was to allow twelve oaks and stone for the repairs of the castle walls and towers. Ralph Freeman held lands *in capite*, in Fromyngton, by the service of carrying the cord round the castle walls when they were measured. 5 Ed. II., he paid half a mark for his relief, and commuted future payments for 7s. 7d. per week. 10 Ed. II., Hugh de Hacluyt charged 5*l.* for repairs.

13 Ed. II., Sheriff Richard Walwyn charged 6*l.* 13s. 6d. for repairs. At the close of the reign the queen held a great council at Hereford, and Hugh le Despenser, the younger, was hanged upon a tall gibbet, outside Friar's Gate. During the reign of Edward II., Wales was loyal, and Hereford therefore neglected. John of Gaunt was its governor, 1 Rich. II., but even his great love of building was not exercised here. As late as 8 Hen. VI., the city had a grant of timber to replace the wall where wanting.

The castle lay unnoticed, and more or less of a ruin for some centuries until it became the scene of one of the struggles between Charles and his people. It was first seized by Sir Wm. Walter, for the Parliament in 1643, with the city, then also walled, and the position of which is naturally strong. He retired from it before Prince Maurice, but shortly afterwards, without stroke of sword, recovered possession, again to retire, so that in 1644 it was still held by the king. In 1645, however, its troubles began in good earnest. Leslie and the Scots laid regular siege to it, and from the south of the Wye opened a destructive fire upon the Castle, Cathedral, and Bishop's Palace. Sir Barnabas Scudamore, with eleven guns, held out stoutly, beat off an attempt at a storm, and forced the enemy to be content with a stockade. As the mills without the walls were destroyed, others were extemporised within them. The Scots then encamped on Burton-shaw Meads, close under the castle, between it and the river. Scudamore, whose defences were out of repair, and his garrison weak, sent out for country folks to assist as workmen. The enemy found this out, and entering under that pretext, succeeded in taking the place. Much injury was then done to the public buildings, and the castle, as belonging to the Crown, and a ruin, was sold about 1652, for the value of the materials.

DESCRIPTION OF THE DEFENCES.

The Castle of Hereford was one of the strongest, most advanced, and most important fortresses upon the Welsh March, and one which being posted in a very fertile and open district, was peculiarly offensive, and very liable to the attacks of the Welsh people. The present remains are not inconsiderable, but as is often the case with fortresses of pre-Norman date, they are confined chiefly to earthworks, and include but slight traces of the later or defences of masonry.

The castle was placed upon the left or northern bank of the Wye, east of and below the city bridge, the cathedral, and in some measure the city, of which it occupied the south-eastern corner. Though excluded from the city liberties, it is, in common with the city, covered at some distance by a steep slope, at the foot of which lies the Yazor brook, which, rising far off to the west beyond Kentchester, and the remains of Magna Castra, supplied the broad tract of low-land still known as Forster's Moor, Moorfield, Canon's Moor, Prior's Moor, Eastern Moor, Moor Barn, and Widemarsh, to the north-west of the city, and which, after skirting its north front below Baron-court, turns Monkmoor and Sculf Mills, and finally falls into the Wye, at Eign Mill, some traces of which remain about half a mile in advance of, and below the castle. The ground thus included is to the north-east, a broad and dry platform of gravel, very fertile, and probably employed as a safe pasture in wild times. The lower tract to the north-west, now drained, and either cultivated or built upon, must in former days, have been an almost impracticable morass.

The city of Hereford, within its walls, was, in plan, about three-fourths of an irregular circle, placed upon the Wye, which forms its concave chord. Its dimensions were, north and south, 600 yards; east and west, 770 yards; and along the river-bank, about 600 yards; including the cathedral and the castle. The total girth was about 2,350 yards. The walls,—no doubt Norman,—upon the older lines were confined to the landward sides, excepting about 50 yards above the city bridge, and were in length about a mile and a quarter. They were pierced by six gates,—Wye Bridge, removed in 1782; Friar's Gate and Eigne, on the west, removed in 1787; Widemarsh Gate and Bye or Bishop's Gate, towards the north, removed in 1798; and St. Andrew's or St. Owen's Gate, on the east, removed in 1786.

The walls were reinforced by fifteen hollow mural towers, placed from 75 yards to 125 yards apart, or at a "flyte shoot,"—explained to be within 400 yards, and here much less. They were rather more than half-round,—that is to say, their side-walls were a little prolonged or stilted in plan, and they were 34 ft. high, having a cruciform loop in front, and probably two others laterally. Of these, two at least remain and are accessible, though their upper half has been removed. The intervening curtain was 16 ft. high on the interior, but it was built against the old English bank, which thus covered the lower 6 ft. of the interior face, and served as a ramp. Besides the two towers already mentioned, and which stood on the north-west face, the wall may be traced along the western side from Bishop's Gate, — now "the Commercial-road,"—to the river-bank. Where it has been pulled down the step remains, and the difference between the level within and without is brought to view. Of this wall the part from the Friar's Gate to the river is open to view from the exterior paddock. The ditch has been partly filled up, but the wall remains about 12 ft. high, unaltered, save by the removal of its upper 4 ft. or 6 ft. At regular intervals along it of about 50 ft. are broad pilaster buttresses, of slight projection, and without sets-off. These die into the wall below its present top. There do not appear to have been any mural towers on this part of the wall. Some kind of manufactory conceals the termination of this wall upon the river, where there was probably a tower; and from this point to the bridge a line of modern houses effectually conceals any foundations that may have escaped. The tracing out the town wall, or what remains of it, though aided by parallel streets, representing the rampart within and the ditch without, is a delicate operation; for the lowest houses of the city are here found, and the inhabitants seem to drive the trade of those who, at Jericho, dwelt in a similar locality. That part of the wall showing the pilasters is, no doubt, the original Norman wall. The part beyond, or, at least, the towers upon it, is probably of the time of Henry III. The wide modern street called Commercial-road, and which takes the place of the old Bishop's Gate, has, of course, caused the removal of all traces of the wall near the site of the gate; but the line may still be traced round the eastern quarter of the city, as far as the angle of the castle. Here, as before, are two roads,—one inside and one outside the line of the wall,—the actual place of which is shown, sometimes by a few stones built into the walls of later houses, and sometimes by a dip of nearly 6 ft. in level. Beyond St. Owen's Gate the actual wall remains for some yards, and may be seen from the exterior road. It extends to the counterscarp of the castle ditch, where it ends abruptly, having been in part pulled down.

The city bridge crosses the Wye by six arches, roundheaded and all apparently old. One is stiffened with three plain square ribs, and another shows traces of a similar addition. The bridge has bold piers, and advantage has been taken of this to widen it by turning a subsidiary arch, about 5 ft. wide, on each face, so that the old work is partially concealed. It does not appear where the fortified gateway was placed; probably upon the last narrow arch on the city side. This does not, indeed, show any trace of having been perforated for a drawbridge, and tradition places the gate at the outer end.

Next to and a little below the bridge, near the river bank, and a little south of the centre of the city stands the cathedral, and below and next to it the castle.

Besides the cathedral and its appendage of St. John's, there stood within the walls four churches—St. Nicholas's, All Saints', St. Peter's, and St. Owen's. There was also St. Martin's, beyond the Wye, destroyed during the civil wars. The disposition of the streets is irregular, and in no way cruciform or indicative of any Roman arrangement. Thus situated and defended, Hereford was a very strong place, as it had need to be, for it was exposed to the fierce and repeated attacks of the Welsh, who especially resented, as was natural, the conquest of their most fertile provinces by the invaders.

The castle, as has been said, occupied the south-eastern quarter of the city. It lay in the parish of St. John. Leland describes it as one of the fairest, largest, and strongest castles in England.

It was composed of two wards placed side by side along the bank of the Wye, not actually on the stream, which, when the defences were of earth, might have undermined them; but about seven yards distant from and on the edge of a steep sloping bank, about 8 ft. above the water.

In general plan the eastern ward was an oblong, the sides being nearly straight, and the east end narrower than the west. The eastern end runs at right angles to the river, and measures along the old line of its wall 100 yards. The south or river front measured 175 yards, as did the north front. The west front, connecting the two, measured 196 yards. This inclosure formed the eastern or lower ward, and contained about 26,000 square yards.

The upper or western ward was applied to the end of the eastern, and like it rested on the river. In form it was rounded, or rather irregularly polygonal, and composed of a large conical mound, wholly artificial, with a circular circumscribing ditch. Within the ditch it measured, on the east and south sides each 100 yards, and, on the three remaining sides, 60 yards each. It was, therefore, in girth about 380 yards, and in area about 14,000 yards. Thus the area of the whole castle, ditches included, might be about 8¼ acres. The eastern ward is stated to have contained about 5½ acres.

The earthworks of the lower ward are tolerably perfect. They are composed of a steep bank along the north and east sides, from 15 ft. to 30 ft. high, the highest and broadest part being at the north-east angle, where there was probably a tower. This bank has evidently been thrown up out of a broad and deep ditch, which remains perfect and full of water, on the north front; but has recently been filled up along the east as far as the river; nor do there remain any traces of the castle mill, which stood at its junction with the river. The ground is raised along the river front about 4 ft., and may have been higher. Along the west or side towards the upper ward, the bank has been thrown into the ditch, and there is only a trace of either. Leland says there was "a great bridge of stone arches, and a draw-bridge in the middle of it, to enter into the castle;" but even in Leland's time this was gone.

The entrance to this ward was evident at its north-west angle, where the moat is crossed by a causeway, and the public now enter. There was a gate-house in Speed's time, which he places, probably by an error of drawing, near the middle of this face. But the bank is there far too high, and the ditch far too deep and broad, to allow of the entrance being placed there.

The modern museum built on the river at the south-west angle of the ward, or rather between the two wards, and over the line of the ditch, contains some parts of an older building, and a doorway of the time of Henry III. or Edward I. This building probably guarded the opening of the middle ditch into the river, and was also the gatehouse between the two wards. Speed shows

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a sort of water-gate here, which is probable enough. The surface of the lower ward is level. In it stood the chapel of St. Cuthbert, with a semicircular apse, and in Speed's time also two small dwelling-houses. Leland says, "There is a fayre and plentifull spring of water in the castell, and that, and the piece of the brooke coming out of the ditch, did drive a mill within the castle." This was in addition to the mill outside and north of the castle, and probably was a part of the present museum-house.

The earthworks of the upper ward have unfortunately been destroyed, the mound and banks thrown into the ditches, and all made level, and much built over. The site of the mound is occupied by an enclosed three-cornered kitchen-garden. The well or spring spoken of as St. Ethelred's, remains. It opens behind the museum building about 50 ft. from the river, and 6 ft. or 8 ft. above it. As it is described as being further north, it is probable that when the ditch was filled up a pipe was laid to bring the water out at its original level. This ward contained the mound known as the Castle Hill, and which seems to have been removed early in the present century. It was girded at the base by a polygonal curtain wall, outside of which was the ditch. It is difficult clearly to understand how the mound was occupied. Leland says "there was one great tower in the inner warde." Sir Henry Slingsby, in his diary, in 1645, describes Hereford city as not much unlike York, "for it hath a round tower mounted upon a hill, like to Clifford's Tower, and the mills near it, with some little works about, having the river Wye running close by; but the walls, though they be high, yet are not mounted upon a ramp, as York walls are." This is intelligible enough, the walls spoken of having been at the base of the hill; but Leland speaks also of a donjon or keep, of what plan is unknown; but upon its wall ten half-round towers, and within, what appears to have been a square tower of considerable height, in the base of which was a dungeon. We may safely conclude from Sir Hy. Slingsby's very clear account that the mound carried, like Cardiff and Kilpeck, a shell-keep; but this could scarcely have been furnished with ten half-round towers. These probably belonged to the *enceinte* wall below. The keep was entered, it seems, from the south-east side by a flight of steep steps up the mound. In the mound was a well, lined with stone, as at York.

The castle ditches were wide, deep, and filled with water, not from the river, or but partially so, but from a brook, which seems to have fed the city ditch on this side, and on reaching the castle at the north-east angle to have divided, a part running direct along the east front of the lower ward, to the river, and the other part supplying the north ditch, and the ditch which divided the upper from the lower ward, and the ditch which passed round the east side of the ward, and divided it from the cathedral precinct. This latter ditch also received some little contribution from St. Ethelred's Well, a spring on the north side of the upper ward, already mentioned. The castle mill stood at the junction of the eastern ditch with the Wye. The water in the castle ditches was of course penned back for the use of the mill, and to strengthen the defences, and it seems to have flowed back upon the city ditch as far as St. Owen's Gate, thus strengthening and connecting the city and the castle.

We have, then, to recapitulate, as the constituent parts of Hereford Castle, an oblong space, with the river on one side, and high banks and ditches on the other three. One end was cut off from the rest, and had its proper ditch, more or less circular, and within it a conical mound, with a table summit, and upon it a shell keep, with some kind of central tower, probably an addition. At the base of the mound, within its ditch, was a second wall, many-sided in plan.

The lower ward no doubt had its walls along the summit of the earthworks, and these probably were low, by reason of the height of the bank and the depth of the ditch beyond. There was a gatehouse at the land entrance at the north-west angle, and a water-gate at the south-western, where also was the passage between the two wards. Very likely there was a postern at the south-eastern angle, where is now a footway.

There is a general resemblance, as regards the mound and bank, between these arrangements and those at Wallingford, Wareham, and Tamworth, and with what is related of the Castle of Worcester.

G. T. C.

1873.

FILTERED WATER FLOATING SWIMMING-BATHS.

We believe that the Legislature must sooner or later entertain the question of the establishment of large swimming-baths within easy reach of all townspeople,—that is to say, a large bath in each comparatively small district. The largeness is necessary to give a sense of pleasure and enjoyment to persons performing a mere requirement of health. Merely to provide a bath of sufficient dimensions to enable people to wash themselves is not sufficient,—at least, it is not sufficient to begin with. When the habit has been acquired, and the personal benefit has been experienced, of frequent bathing, smaller baths may be sufficient. In the beginning, however,—and we have yet to make a beginning in this matter,—it is necessary to create a sense of refinement in the vulgar by offering pleasure with utility. The many baths that have been already established have mostly proved failures, for two reasons,—the one being the smallness, and gloominess, and general discomfort of the place, the cause of which is chiefly to be attributed to the high price at which alone land can be purchased in large towns in situations suitable for baths, and the consequent failure to pay a reasonable dividend on the large amount required for the construction of a proper bath; and the other, that they are situated in such out-of-the-way places as to be unknown to many who would make use even of them. Although we believe that ultimately such baths as we have indicated must be constructed in every large town, with the assistance or by the direct control of the Imperial Legislature, we are sensible that they cannot be of immediate attainment; and in the meantime it may be well to consider the practicability of making use of rivers.

As almost every large town is situated on a river, it is to it that attention is naturally first directed; but the very thing which makes bathing-places much required,—population,—is also the cause of the pollution of the river, and, in fact, it would be hard to find in England a river running through or by a large town which is fit to bathe in.

The following communication by Mr. Chas. Slagg, C.E., suggests a scheme for the construction of floating swimming-baths, to be placed on rivers the water of which is not clear enough to bathe in.

It is proposed to place floating baths in the current of a river, and by means of tide wheels to utilise the motive power of the current to pump water into the bath from a well into which the river-water enters through a filter in the bottom of the vessel.

It is proposed to make the length of the swimming-bath 120 ft., and its width 30 ft.; and the outside dimensions of the vessel, 200 ft. long and 44 ft. wide. A platform 12 ft. in width is to run round the swimming-bath, its width being divided into three portions. The middle portion, 3 ft. in width, is to be occupied by dressing-boxes. The inner portion, 5 ft. in width, is to project over the side of the bath, and form a promenade, being 2 ft. or 3 ft. above the level of the water in the bath. The outer portion of the platform, 4 ft. in width, is to form a gangway upon which persons will arrive, and from which they will depart; the entrances to the dressing-boxes being from this outer gangway.

Near to the filter at each end of the vessel is placed a pair of tide wheels or current wheels, connected by a shaft across the deck of the vessel, upon which is to be a spur-wheel and gearing, working a crank shaft and the pumps. Two pumps are to be placed in a well at each end of the vessel. The pumps are to be of equal capacity, and one is to supply the water to the bath, while the other exhausts it from it. Adjoining the well is to be a space in the bottom of the vessel, from which the planking is omitted, and in its room is to be placed copper wire-gauze grating, such as is commonly used in water works to strain the water. This grating, which is to be flush with the underside of the bottom planking, is to be supported by bars of wood properly framed together. Upon the grating is to be laid wool, cotton, flax, hemp, or other fibrous material, or a mixture of two or more of such substances, upon which are to be placed coarse sand and gravel. By lowering the water in the well by pumping, a head is created outside the vessel sufficient to cause the river-water to flow inwards to the well through the filtering medium.

The bottom of the vessel slopes downward from each end to the middle of its length, so that when the swimming-bath is filled with water there shall be a depth of from 4 to 5 ft. at each end, and from 8 ft. to 10 ft. in the middle. Those who prefer a header may choose the centre portion of each side of the bath.

Seeing that the power to be applied is costless nearly,—constant, nearly,—and in most situations of sufficient force to elevate the water to a height from which it may descend in a shower through a perforated floor, it is proposed to pump the water into an elevated tank of, say, 8 ft. clear headway, and containing, say, 5,000 gallons, at each end of the vessel, and so to afford a shower-bath, douche, or other similar form of bath, on a large scale. A space at each end of the swimming-bath 6 ft. in width, and 30 ft. in length, or whatever the width of the vessel may be, is to be allotted to those who may take their bath in this way, either solely or before plunging into the swimming-bath.

Thus the outward aspect of the bath will be that of a long barge, with a row of dressing-boxes along each side and across each end; a tank overhead near each end, and near each tank a wheel, something like the paddle-wheel of a steamboat (and protected in the same manner), which will be slowly turned by the current and pump filtered water into the tank, from which it will descend either through the shower-bath or directly into the swimming-bath, at the discretion of the bath-attendant.

A nearly constant current of fresh water will be caused by the action of one set of pumps withdrawing the water and discharging it into the river, while the other set draw water into the bath through the filters. For a short time before and after the turn of the tide, the wheels will not work; but there will be water in the tanks, to the amount of from 5,000 to 10,000 gallons, always ready for use.

If the total elevation of the water, including both the supply and exhaust, be taken at 20 ft., and the time in which the tank (containing 5,000 gallons) is to be filled, at one hour, the power to be exerted by each pair of wheels will not be more than half an effective horse-power. Taking the velocities of the tides of the Thames, recorded by the Ordnance Survey Commission, by Mr. Rennie, and by Mr. Hawksley, and making the wheels light, it may be said that the current is fully equal to this power, without here going into figures of detail.

In respect of the form of the filter here described, it may be worthy of remark, that although on land upward filtration is objectionable, because of the difficulty of dealing with the accumulation of mud underneath the filter; yet in this case it is of a good form, because the current in the river has a constant tendency to wash away any accumulation that the motion of the water inwards tends to cause at the entrance.

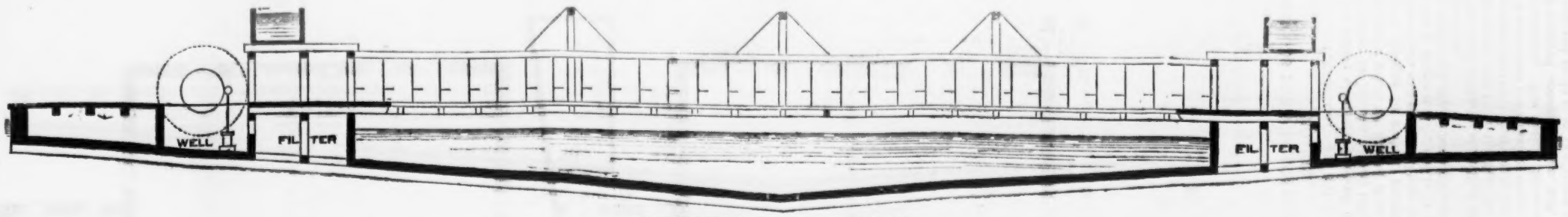
It is proposed to establish, in connexion with the Bath, a service of boats to and from each shore, one payment to include all services. (This expense is included in the estimate to follow; but another and perhaps better plan would be to make arrangements with the steamboat companies.)

It is proposed that a launderer be employed to wash and dry the towels on board the vessel, for which there is room below deck at each end of the vessel. A sum is included in the estimate for the purchase of boats, washing and drying machines, towels, and other stores.

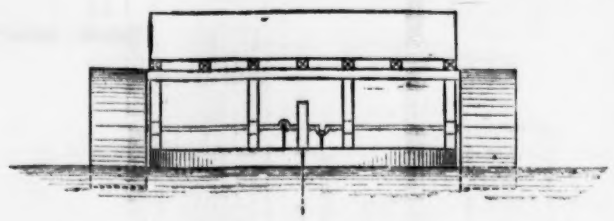
A ticket-box is to be established on each shore opposite, or as nearly as may be, to the bath, the rent of which is included in the estimate of expenses.

In situations where there is no current of water, or an insufficient one, it is proposed to place a small steam-engine on board the vessel, in substitution of the wheels.

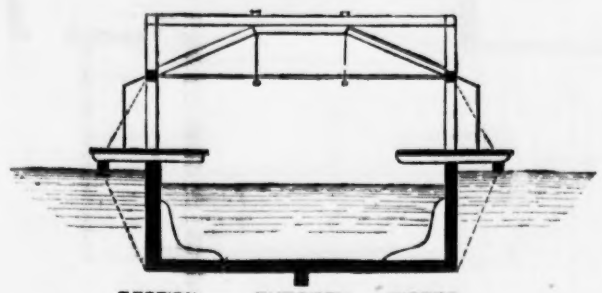
Note.—The details have been worked out, and show the following results. The cost of each bath, completely furnished, is estimated at 3,000*l*. The estimated net annual income, making the charges small, and after paying all expenses, is 278*l*., or fully 9 per cent., calculated for half the year, or twenty-six weeks. No account of Sunday mornings is taken in this estimate; but until nine o'clock the bath might be opened either free or at a nominal charge. Neither is any return estimated during the remaining half-year; but possibly some use might be found for the bath during that time also.



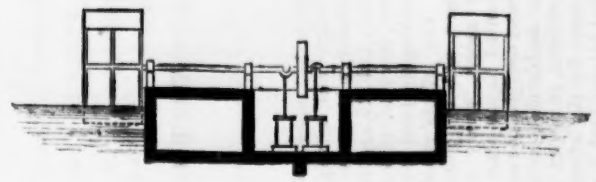
LONGITUDINAL SECTION



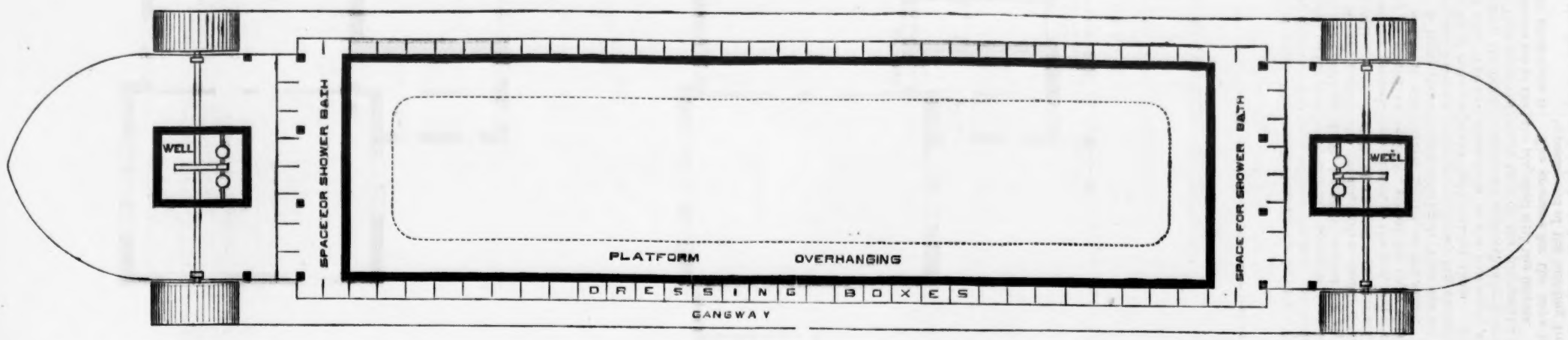
END ELEVATION



SECTION THROUGH MIDDLE

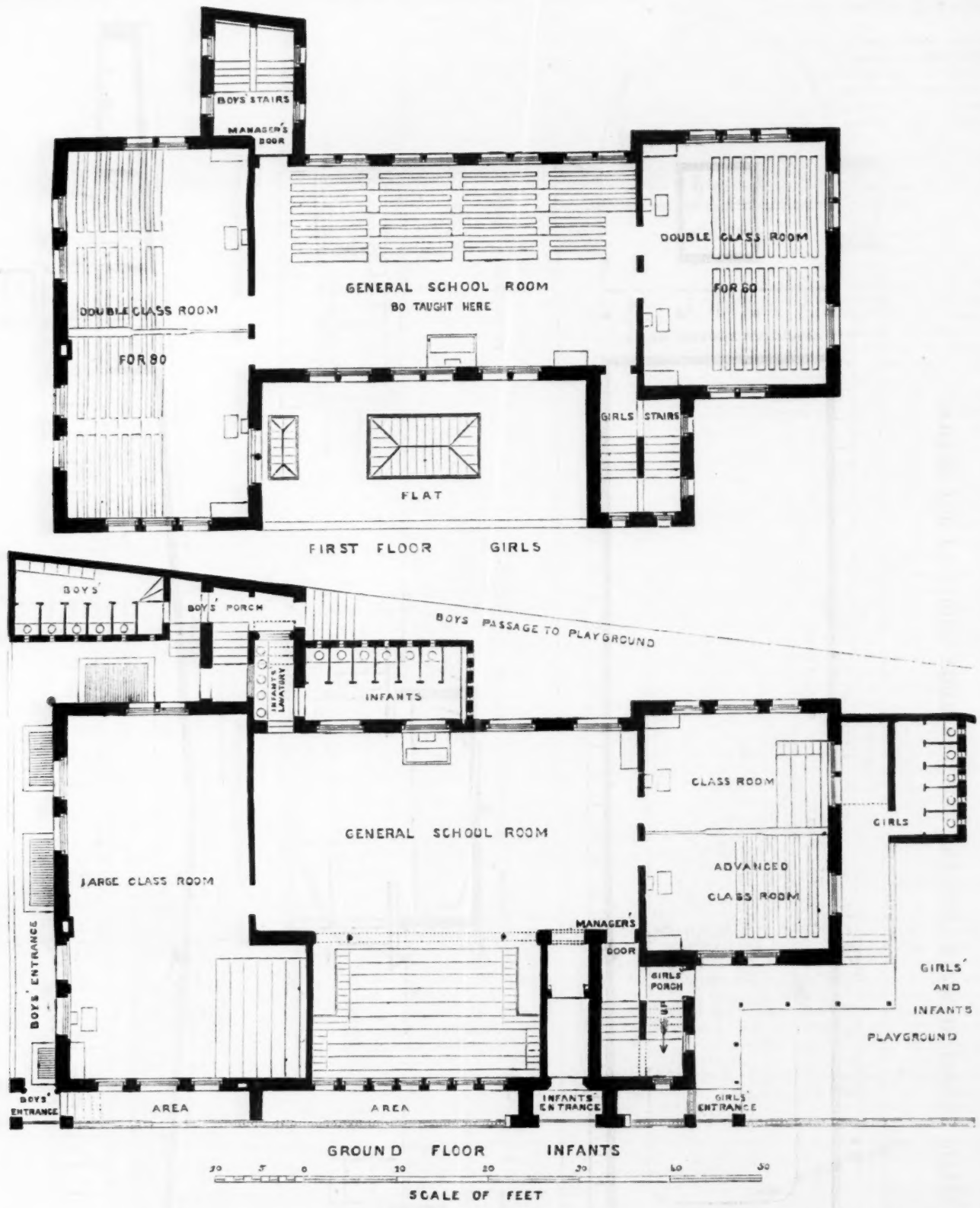


SECTION THROUGH WELL



PLAN

SCHEME FOR PROVIDING FILTERED-WATER SWIMMING-BATHS IN IMPURE RIVERS.



PUBLIC ELEMENTARY SCHOOLS, BLUNDELL STREET, ISLINGTON.

SCHOOLS FOR THE LONDON SCHOOL BOARD,

BLUNDELL-STREET, ISLINGTON.

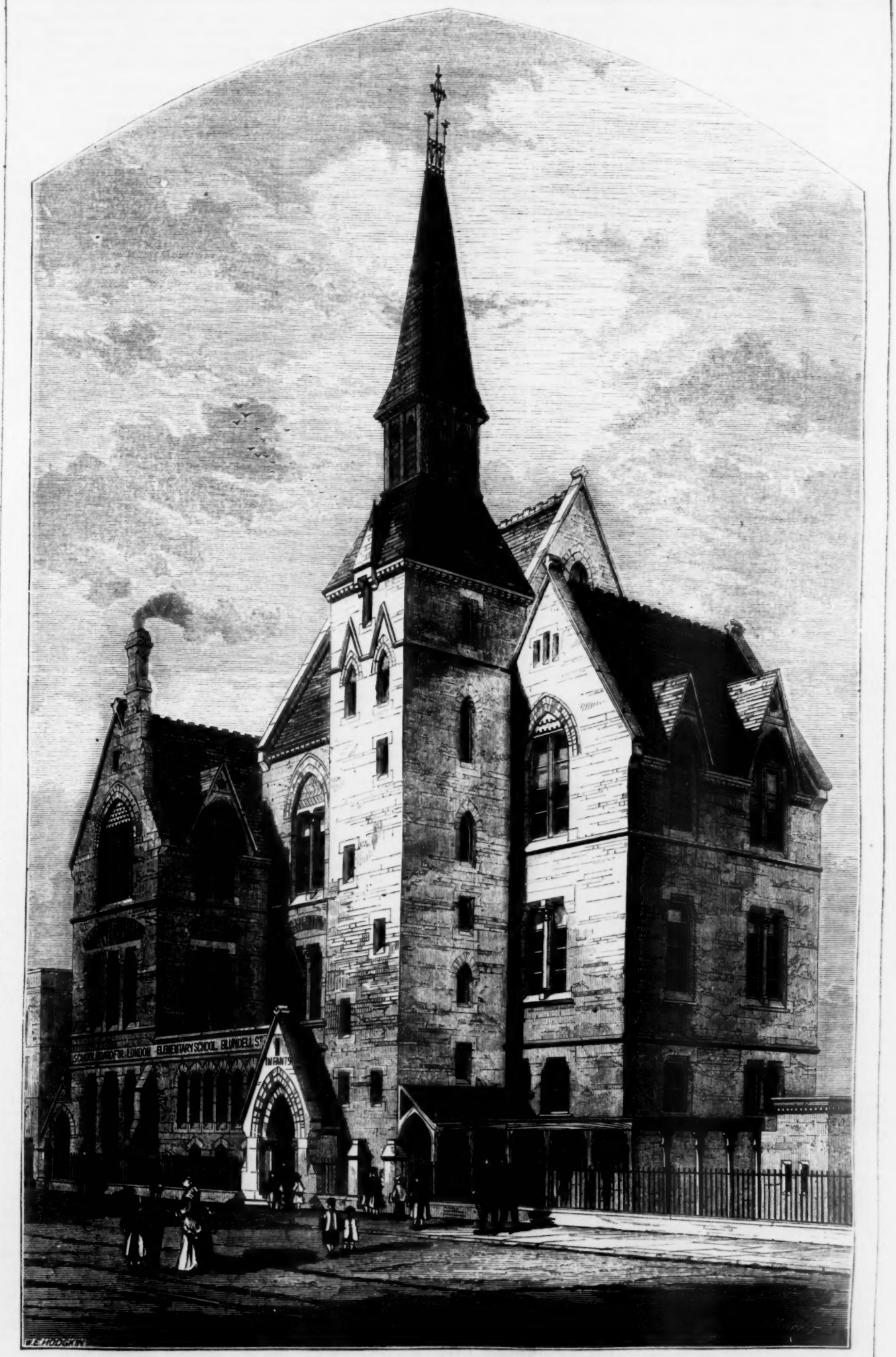
THE public elementary school now in course of erection in Blundell-street, Islington, is one of those for which the School Board for London invited designs in limited competition. The design which was successful was that submitted by Mr. T. Roger Smith, and it is being carried out, under his superintendence, substantially as submitted.

The chief difficulty attending the planning of this school rose from the fact that only a comparatively moderate portion of the site, and that of a somewhat inconvenient shape, was available for building. The design, however, supplies all the required accommodation, and, on the whole is believed to do so in as efficient a manner as if there had been no irregularity of site. The design was arranged for 740 children—300 infants on the ground floor, 220 girls on the first floor, and 220 boys on the second. The building will, however, seat eight more in each school, making the total accommodation 804.

The infants' school-room is on the ground-floor, and the principal gallery is placed in a recess, partly top lighted, which is not carried higher than this floor. A large class-room occupies one end of this room, and a second or double class-room, separated by a movable partition, is placed at the other end. The entrance for the infants is direct from the front, and adjoins that for the girls. They share the girls' play-ground; their conveniences are at the back of the main building; their cloak-room is under the large gallery.

The girls' entrance is from the front, and adjoins that for the infants. They have a staircase without winders, and with a central solid wall, and are accommodated in a school-room 22 ft. by 42 ft., seated for eighty children, of two grades, with a double class-room 20 ft. by 40 ft., also seated for eighty children of the next two grades, at one end, and a class-room 20 ft. by 26 ft., seated for sixty children of the two highest grades, at the other. The class-rooms obtain side light. This has not been obtainable in the school-room: the children there have the north light behind them. The girls have a cloak-room in the basement, and their conveniences are approached by a covered way. They share part of the playground and the use of the playshed with the infants.

The entrance for the boys is entirely at the opposite end of the building from that for girls and infants, and is at the rear. A separate



SCHOOLS FOR THE LONDON SCHOOL BOARD, BLUNDELL STREET, ISLINGTON.——MR. T. ROGER SMITH, ARCHITECT.

access to their playground has been preserved for them at the rear of the building. Their staircase, school, and class rooms are similar in size and arrangement to those below them, which the girls occupy.

The original design provided for an additional story, over the boys' school-room, to contain a drawing class-room and teachers' rooms. This will be dispensed with in carrying out the building. The basement, besides some teachers' rooms and boys' and girls' lavatories, will contain a residence for the care-taker and the necessary furnace-room.

The entire building will be warmed by a hot-water apparatus in the basement, from which heated air will be conveyed to every school and class room by flues provided for the purpose. This apparatus has been designed and arranged by Mr. D. O. Boyd.

With reference to through window-ventilation for all the school and class rooms, the windows will have the casements hinged at the bottom, and opening inwards, such as are often known as "hospital windows."

The material is brick, with stone sparingly introduced, and the roofs are slated. The contract has been taken by Messrs. L. H. & R. Roberts, of Islington, at the sum of 6,370*l*. The clerk of works is Mr. Joshua Lewis.

THE WASTE OF COAL.

On the 1st inst., Sir W. G. Armstrong delivered the presidential address to the North of England Institute of Mining and Mechanical Engineers. It included many valuable observations, but we are forced to confine ourselves to those on one subject. Sir William said,—As I shall speak of coal in an economic as well as in a technical point of view, I cannot well avoid making some reference to its present excessive cost, because coal, like everything else, must be governed in the extent of its application by its price in the market. In addressing an Institution, so largely composed, as this is, of colliery proprietors, it is not an agreeable task to dwell on the evil of dear coal; but our Institution is not a commercial one, and I must speak of this subject, not as affecting individual interests, but as bearing upon mechanical art and national prosperity.

For many years past the consumption of coal has been increasing at the rate of about 4 per cent. per annum, computed in the manner of compound interest. We are all familiar with the cumulative effects of compound rates of increase; and it is easy to see that if the consumption of coal continued to advance at this rate, we should speedily arrive at impossible quantities. Thus, in eighteen years our present enormous consumption would be doubled; in thirty-six years it would be quadrupled; and in fifty-four years it would be eight times greater than at present. It is clear, therefore, that our consumption has been increasing at a rate which could not possibly last. If nothing else was destined to arrest it, a failure of mining labour was inevitably approaching to have that effect; but a few years would probably have yet elapsed before the number of hands became inadequate to meet the required demand, had not the miners precipitated the event by restricting the hours of work.

The hours of mining labour in this district, twenty-five years ago, were nine per day. At a subsequent date they were reduced to eight, then to seven, and finally to six. Hitherto the men have worked eleven days a fortnight, but it seems doubtful whether more than ten can now be worked, consistently with the very proper limitations of the recent Coal Mines Act, in regard to the labour of the boys. The full hours per fortnight will therefore at the most be sixty-six, or thirty-three hours per week of labour at the face of the coal; but as it is only the steadiest men that work full time, the average time will, of course, be considerably below that limit. I am not aware to what extent reduction of time has been carried in other parts of England, but we hear of the same policy of restriction, either of time or output, or of both, being put in practice in all the important coal districts. I do not suppose that the average output, per man, has fallen off proportionately to the reduction of hours. The men work hard, even harder than formerly, while at their posts; but it is impossible that so great a reduction of working time can have taken place without so lessening the output, per head, as to neutralise, in a great degree, the increase of production due to the numerical growth of the mining population.

Under these two conditions of increasing consumption and restricted labour, we have reached a point at which the demand has overtaken the supply. As yet, the deficiency cannot be great, for it has only very recently become apparent. Consumption does not advance by jumps; and we may assume that if a progressive increase of 4 or 5 per cent. per annum could have been maintained in the production of coal, a balance would still have existed between supply and demand. Though production has ceased to keep up with demand, it has not, so far as we can judge, actually receded; and it would therefore appear that a small addition to the present supply would restore the equilibrium. But small as the deficiency must be, it is sufficient to create a sense of scarcity, and, as a consequence, to send up prices to a famine pitch.

The situation is a grave one, and the public has not yet fully realised how very grave it is. Taking the present consumption at 110 millions of tons (exclusive of exportation), and estimating the extra price to consumers at 8*s*. a ton over all, the annual loss to the community from the additional cost of fuel amounts to 44 millions sterling. Had a Government tax of 44 millions been levied upon coal, in addition to existing taxation, the effect would have been regarded as utterly ruinous, not only in regard to its prodigious amount, but on account of its repressive effect upon every kind of production. Yet, it is a fact, that we are now paying the equivalent of such a tax, with this unfavourable difference—that the money does not go into the coffers of the nation. Whether it chiefly goes to coal-owners or coal-miners is a question which I need not discuss; but I may observe, that the restrictive action of the men has benefited their employers as well as themselves, and that the public are the only sufferers. Coal-owners have long been aware that limitation of quantity was the only effectual mode of raising price; but they have never been able, by their own action, to maintain a restricted production. At last their workmen have done it for them, and we see the result.

Whether the trade of the country will bear up against the heavy burden of dear coal, combined as it is with dearness of other products, arising from similar causes in other industries, is a question on which I shall not attempt to prophesy. It will be more to the purpose to consider what can be done to mitigate the evils under which the nation is now labouring in regard to the price of coal. It is vain to appeal for relief either to coal-owners or coal-workers. Self-interest is the ruling principle of trade, and it is visionary to expect that men will sell either labour or the produce of labour for less than the market price. However generous a man may be, he will not exhibit his generosity by selling an article below its value. Speaking, then, as one of the public, and not as a coal-owner, I say we must strive to economise the use of coal; speaking as president of an institution of mining and mechanical engineers, I say we must endeavour to make up for the deficiency of human labour by a more extended use of machine labour.

The waste of coal, both in domestic and manufacturing use, is a threadbare subject; but there never was a time when its consideration was of so much importance as at present. The small deficiency of supply, which is now so violently stimulating the market, would be just as effectually expunged by economising consumption as by increasing production. If, on the one hand, the mining population could easily, by a few hours' addition to their weekly labour, restore the equilibrium between supply and demand, so, on the other hand, consumers, taken as a body, could do the same thing, by discontinuing in a small degree those reckless habits of wasting coal to which they obstinately adhere.

The consumption of coal takes place under three great divisions, each absorbing about one-third of the whole produce: — 1st. Domestic consumption; 2nd. Steam-engine consumption; and 3rd. Iron-making and other manufacturing processes. In the first two divisions the waste is simply shameful; in the third it is not so great, but still considerable, though in some processes, and especially in the smelting of iron, economy of fuel has been so diligently pursued that there remains but little apparent scope for further saving.

I shall not dwell on the waste of coal in domestic consumption, as it is scarcely a subject for engineers; but the circumstances of the times are such as to forbid my passing it unnoticed. It is impossible to conceive any system of heating a dwelling more wasteful than that of sinking the fireplace into a wall directly beneath the chimney, which carries off the products of combustion. Nothing can be clearer than the advantage to be gained by merely advancing the fireplace a little into the room, and constructing it with proper heating surfaces, as in the "Gill stove" and in many other stoves acting on the same principle. There is no occasion to shut out the fire from view. Neither is there any difficulty about ventilation, since fresh air can easily be introduced from the exterior by a pipe delivering its supply against the heated plates, so as to temper the air before it enters the room. By this simple and unobjectionable departure from the conventional fireplace, the quantity of coal required to produce a given heating effect might easily be reduced to one-half, and still greater economy would be effected by the use of hot-water apparatus, which, however, has the objection of being too costly in first outlay to admit of very general application. For cooking purposes, also, the consumption of coal is in most houses equally extravagant, and I may add, equally inexcusable, since the means of prevention are attainable by the adoption of known methods and appliances for concentrating the heat upon the work to be done.

THE SIMPLICITY AND SAFETY OF SEWER VENTILATION.

In the course of a paper on this subject recently read, Dr. Alfred Carpenter said the principle to be avoided is stagnation; the principle to be inculcated is movement. Keep any quantity of sewage moving, and no evil will arise; keep the air contained in sewers in a similar state of movement, and no danger from it is possible. Given a number of cylinders with increased area, but decreasing capacity, the problem is how to obtain such a circulation of air in those cylinders as shall prevent the possibility of stagnation of any air contained in them. I contend that if the superficial area of the smaller ends, if open to the air, be greater than the square of the cross sections of the sewer itself, and if no dead ends are allowed in any house-drain or branch sewer, and if every soil-pipe is extended upwards in a straight line above the watercloset, so as to provide the openings, there will be a constant current of air from within the sewer through the house-drains into the open air, which will prevent the possibility of stagnation, and cut short the evils which spring from the introduction of sewer gases into houses. It is true that occasionally there might be a reversed action in consequence of the disuse of, or the stoppage of, a given sewer, by flooding. This would be occasional only, and would not be attended with danger to the inmates of the houses or the sewer.

If sewage is running down a drain or sewer, it will be always found that air is passing upwards, and thus alterations in the pressure occur; and there is a difference in the density of the air, which will be sufficient to produce a movement. The saturation with moisture will also vary, being always greater in the sewer than in the external air; there will also be variations in temperature: if the air is cold out of doors there will be an escape of warm air. This is constantly seen in snowy weather and frosty seasons, when a melted space is observed around the gratings in the streets, and on the iron doors which cover the man-holes; whilst if the air is warmer outside, the difference in the quantity of contained moisture keeps up the circulation in the same direction. The wave of sewage passing down a sewer displaces an equal wave of air, which rushes up to occupy the space vacated by the sewage. The intermittent discharge of hot water also assists in the same direction, and it is not found that the temperature of town sewers ever falls below 42° or 44° F.

Thus, then, there is an alteration of density produced by the wave of sewage passing down a sewer, commencing a circulation, which is kept up by the difference in the physical states I have already mentioned. Now, if we provide a sufficient number of openings at the smaller ends of the house-drains, so that every branch communicates directly with the open air, and no dead ends exist at all, we shall bring into play every one of the forces which arise from differences of density of temperature and moisture; whilst, if there

should be new productions within the sewers themselves, another powerful agent comes into play, namely, the law by which gases diffuse themselves into space. These altogether will effectually prevent that stagnation which gives rise to danger in sewers. The openings will act, to some extent at least, in manner like to the stomata in the leaves of plants, and the pores in the skin, by promoting an interchange of material and keeping up circulation. Thus stagnation will be prevented, and without stagnation there will be no production of those matters capable of setting up disease in the human frame; or if those matters are produced in the first instance above ground, and are discharged into sewers, there will be not that concentration of matter which is necessary for evil to arise from it, and no reproduction of matter will be possible. The constant current of air through the sewer will act upon such morbific matter, if it should float about in air in such a way as will oxidise it and render it innocuous, depriving it of its malignant power.

It is really curious and trying to read in local journals of intelligent men recommending the erection of furnaces for the destruction of gases, and the expenditure of large sums of money for the purpose of dissipating noxious fumes, when it is so much more easy to prevent their production altogether, if the simple plan I advocate is put into general operation. Let it be general, and the production and spread of typhoid from sewer gases will altogether disappear from the list of causes of death in towns, with a general plan of sewerage.

There may be any number of water-closets on the same pipe, one above another, with but one ventilator. It is not necessary for the extension to be carried up a long distance above the houses unless the houses are very crowded, and the openings likely to be in close courts or alleys. It may terminate as soon as possible, and if it is near to an outer wall (as it always ought to be), it may pierce the wall and be left so, being cut off and left flush with the outer surface of the wall, cemented into it, and covered over by a perforated iron grating. The tall erections and queer-looking things that one sees about in all directions when ventilation is practised, are unnecessary. They are put up by persons who do not understand the principle for which ventilation is carried out—namely, not for the purpose of carrying up stinks and dangerous miasms, but to provide a draught which will prevent the origin of danger altogether.

If a sufficient number of the openings I have indicated be provided on a given sewer—namely, at least one for each soil-pipe, and one for each branch drain, which may be used for any other purpose (and which it is not possible to cut off, so that the communication is indirect only), no evil will be generated in the sewer, for no stagnation will arise, no reproduction will be possible, and no concentration can take place. It unfortunately happens that the principle is ignored, or the operation of it reduced to a minimum by putting a number of right angles on the ventilating pipe for the purpose of carrying it round spoutings, string courses, and the eaves of the house, or any other impediments which may happen to come in the way.

It may be said that the plan I advocate speaks of outlets only, but there must be inlets for the air which is to continually traverse the house-drains. These inlets in the Croydon districts have been made in the public sewer by openings which occur every 100 yards. They are covered by gratings, and guarded by baskets containing charcoal, placed in a particular manner, so that the charcoal cannot get wet. In the majority of instances these openings are inlets for air, and if they are examined in dry weather, the charcoal is seen to be covered with dust, proving that air has descended into the sewer. In some the charcoal is always black, and from some of these I have known a foul smell proceed when the basket of charcoal has been temporarily removed. It is seen that the openings nearest to the outlet, that is, in the lowest part of the sewers, are inlets; whilst those near to the upper end are outlets.

The same rule applies to the openings which exist in London streets; some of them give out sickening odours, which are deprived of their dangerous qualities by dilution with fresh air, a process by which their striking character is often made more manifest, but their evil nature reduced. The tendency among local authorities is to diminish these openings, whilst the curative plan is to admit more air, and remove the deposit which gives rise to the smell.

ON CYLINDRICAL OR COLUMNAR FOUNDATIONS IN CONCRETE, BRICK-WORK, AND STONEWORK.

This was the subject of a paper by Mr. John Milroy, C.E., read at the Institution of Civil Engineers, on January 28th. In this communication a description was given of an attempt which had been made by the author, acting partly in concert with Mr. J. W. Butler, to render concrete, brick, and stone, more easily available for cylindrical foundations. After alluding to brick cylinders, which had been in use in India for centuries, and had more than once been suggested for home works, it was remarked that probably the engineers for the trustees of the Clyde navigation had been the first to adopt them in connexion with a great and important undertaking. In 1869, the trustees requested Mr. J. F. Bateman and Mr. J. Deas to report on the best means for providing a large and progressive extension of quayage, suited to the present and future requirements of the harbour of Glasgow. With a view to obtain a greater depth of water than could be had alongside the existing quays, their attention was directed to iron cylinders, and subsequently to brick cylinders. The result was that, in 1870, an arrangement was made with the author, in conjunction with the late Mr. Brassey, to construct in brick cylinders, to some extent as an experimental work, the Plantation Quay, an extension westward of the wharfs on the south side of the Clyde. After a brief introductory description of this work, the author confined his remarks to a novel manner of making the brick cylinders, to the mode of sinking them, to the form of the shoe, and to the general arrangements adopted in the execution of the work.

The Plantation Quay was founded on 100 brick cylinders, sunk in a continuous line close together, so as to form a length of 400 yards of quay. The wells were 12 ft. in external diameter, and 2 ft. 4 in. thick, thus having an internal diameter of 7 ft. 4 in. Their shape was circular, except at the points of contact, where they were formed with tongue and groove, *i.e.* a square projection fitting into and sliding in a corresponding recess in the adjoining well. From the bottom of a trench which was cut down nearly to the level of low water, the cylinders were sunk about 36 ft.; but the earth on the river side was removed when the sinking was completed, and dredged to a depth of 20 ft. below low-water level, thus leaving a length of about 14 ft. of cylinder beneath the dredged bed of the river. The cylinders were only carried up 2 ft. above low-water mark; a plug of concrete was then lowered to the bottom of each cylinder, to give it a proper bearing, and to protect the rest of the filling from disturbing influences, when the cylinders were refilled with the sand and other materials which had been excavated. On this foundation, suitably prepared, the rest of the quay was built as an ordinary retaining wall.

Instead of constructing the cylinders brick by brick, *in situ*, as was the custom in India, the author resolved, with a view to the expeditious execution of the work, to pursue the novel course of making them in rings, in frames placed on a platform near the line of the quay, and then to put them together, *in situ*, after they had been allowed to consolidate. Close to the line of the cylinders, over which was erected a high gauntry, with a steam traveller, a wooden platform was laid with a low gauntry, carrying a steam traveller. On this platform the rings were moulded in frames, which were constructed of wood in four sections bolted together. Annular layers of wood were fixed to the platform, in such a way that their outer edges might keep the frames in place, while their inner edges served as guides in shaping the eye of the rings. When a ring had been built up with bricks and Portland cement, and had partially set, the frame was removed, and the ring, which weighed between nine and ten tons, was allowed to stand a few days to consolidate thoroughly. When the ring had become thoroughly indurated, it could be removed by means of the travellers and a line of rails, either to be fixed in place or to be stored up for future use.

In practical construction, concrete differed from brick cylinders only in this, that they must be made in frames or moulds, and that an internal as well as an external frame must be used. In choosing between them, the question was chiefly one of expense. When their relative cost was equal, concrete was perhaps to be preferred, as the process of mixing the concrete and filling the frame was so simple that it could be carried on, under proper surveillance, with unskilled labour. In this connexion, mention might be made of the application by Mr. J. W. Butler of Mr. Ransome's artificial stone "apœnite," on the same system as that employed by the author. Having conceived the idea that it was admirably adapted for the construction of cylinders, he made and sank, in 1871, at the Hermitage Wharf, on the Thames, some experimental cylinders with complete success. They were 8 ft. in diameter, and 9 in. thick. The courses or rings were moulded in frames, and were cemented together with the mixture of which they were composed.

THE WALLS AND FLOORS OF HOSPITALS.

It would appear from Dr. Langstaff's address to the Southampton Medical Society,* that many existing hospitals are too large to afford the best chance of recovery of patients who undergo surgical operations. It is impossible to ventilate large wards efficiently while the patients are there, for the foul air arising from their bodies and their wounds hangs about the bedding, furniture, and walls, and cannot be got rid of without first removing the patients. The remedy for this, radically, is to build a large number of small separate rooms, instead of the few large ones now generally existing; but in trying to make the best of what we have, Dr. Langstaff says he has found—as well as other physicians whom he mentions,—that the floors and walls of a hospital, after continued use, absorb matter which leads to the outbreak and spread of disease; and that it behoves, therefore, to apply to them a non-absorbent material, and one that can be readily cleaned. Parian cement has of late years been much used for the walls of hospitals and large buildings; but although this answers very well for small surfaces, yet for large surfaces, its want of elasticity causes large numbers of minute cracks, which afford lodgement for the noxious material floating in the air.

When these Parian walls are cleaned, the surface matter is washed into the cracks, and thus forms an organic nidus for the propagation of a poison. The best method, he believes, of rendering hospital walls and ceilings non-absorbent is to paint them on a smooth surface with several coats of paint, and finally to varnish them, or, in the case of Parian walls cracked as described, a solution of paraffine, either in turpentine or paraffine oil, thoroughly applied to the walls with a brush, will entirely fill up the cracks. Hard paraffine is a white, solid, volatile substance, very like white wax, and its affinities are so feeble that it has derived its name from this peculiarity. It is applied to floors as well as walls. Floors in this country, says the author, are as a rule very badly laid, and when they are washed and scrubbed, the organic matter is driven into the interstices, and thus cleansing by washing is of all things the most noxious, and the more it can be done away with the better.

Dr. Langstaff has tried, and found it to answer very well, the following process for rendering wood non-absorbent: — A quantity of hard paraffine is first melted in an iron or earthenware vessel, and whilst hot it is painted over a portion of the wood, and then is ironed into it with a box-iron, heated from the interior by charcoal. The paraffine in this way is driven out into the wood to a depth of something like ¼ in., and a surface of paraffine is thus procured. The superfluous paraffine is scraped off, and the floor is brushed with a weighted hard brush, and the oftener it is brushed the better the surface obtained. The floor thus prepared is not sticky, requires no re-application of the material, and scarcely any fluids spilled on it will affect its surface. It has proved not to be slippery, when list slippers are used.

"When floors are laid, especial care should be taken that the planks (boards?) of which they are composed be jammed up closely together, and they never should be permanently nailed down till they have been placed a year or more. The planks should be oak, the smaller, in reason, the better." It is useful to have a doctor's opinion on these things, even though a practical builder may modify the details.

Digest of Sanitary Law.—In reply to Sir M. H. Beach, Mr. Stansfeld has stated, in the Commons, that the digest is already in type, and the question of printing is simply one of time.

* Hospital Hygiene, by Charles Langstaff, M.D., M.R.C.S.E. London: J. & A. Churchill. 1872.

SCHOOL BOARDS.

London.—The Rev. B. Waugh asked whether arrangements had been made to have a large hall in any of the schools of the Greenwich district. Mr. C. Reed, M.P., said the Works Committee had the question under consideration. No arrangement of the kind had yet been made. Mr. Tabrum said the subject was before the working drawings committee, and it was considered important that there should be in each division at least one school where there should be a hall or room large enough to hold a meeting for the examination of scholars, or for other collective gatherings.

Reading.—Mr. Joseph Morris read a report explanatory of several plans for schools which he had sent in, and one was selected and adopted by the Board.

Appleton Wiske.—A new Board school has been opened here. The building is of brick, without any attempt at ornamentation. The principal room is 39 ft. by 20 ft.; the class-room, 12 ft. by 20 ft.; and the ceiling across the collar-beams, 15 ft. from the floor. The desks and seats are Messrs. Sidebotham & Co.'s patent "national desks," which form either a table, a desk with a gentle slope, or a seat, when the desk is turned down for the back to rest against. The contractor for the building was Mr. Thos. Peacock, of Northallerton, who sub-let the joiners', ironmongers', plumbers', painters', and glaziers' work to Mr. James Park, of Appleton Wiske. The whole of the work has been finished; and the total cost, including the site, buildings, desks, &c., has been rather under 4*l.* per scholar, which is one of the cheapest Board schools yet built.

PAROCHIAL RELIEF.

LAST Monday evening, Mr. E. J. Castle read a paper at the Rooms of the Institution of Surveyors, Great George-street, on the "Origin of Parochial Relief."

The present system of parochial relief, he said, is based upon the 43rd Eliz., c. 2. But though this statute is the basis, it is not the origin of the system. It is true, a popular idea exists that up to the dissolution of the monasteries by Henry VIII. the charitable institutions of the country were sufficient to support the poor, and that the Act of Elizabeth was passed in order to meet the wants of the new order of things. This, however, is not the case. The Act of Elizabeth is only one link in a long chain of legislation—and the result of a system that sprang into existence in what may, as far as law is concerned, be called pre-historic times, and which had been gradually developed up to the last Parliament of Elizabeth, when, from causes that were pointed out, further legislation ceased, and we have had to be satisfied to base our system of parochial relief upon an Act which all must admit to be unequal in its operation and full of anomalies. In the last session of Parliament, however, there were symptoms that the governing powers were awaking from their lethargy, and a draft of a Bill was brought before this Institution which offered some hopes of improvement; these hopes, however, for a time, fell to the ground, and it is impossible to say whether they will ever be realised. In the meanwhile, it may not be out of place if I bring before this body the gradual process which produced the Act of Elizabeth. It is true that the information is, at present, only to be collected from old Acts, many of which were long since repealed, and expunged from our statute-book. Yet, I think, from their perusal, I shall be able to throw some curious light upon the domestic history of England, especially with regard to the predecessors of the modern pauper.

The various steps in the process were then described with some minuteness, and the reader concluded thus:—The Act of Elizabeth refers to personal as well as to real property, but owing, perhaps, to the difficulty of assessing personal property and, perhaps, to the modern principle of throwing all burdens upon land, a custom sprang up in many parishes of not assessing this property, and afterwards by an annual statute personal property is declared not rateable; otherwise the Act of Elizabeth remains untouched in principle to the present time. To sum up the history of these statutes, we find that, from the earliest period, the right of the poor to parochial relief has always been admitted; but that the Legislature rested content with declaring this to be the law, directing its earlier efforts—not to the support of poverty, but to its suppression, — going so far as to punish vagrancy with whippings, the stocks, branding, slavery, and even death. That gradually, however, the real difficulty became apparent, and it was discovered to be quite as important to find food and work for the poor in their parish, as it was considered to be to force the destitute by all means to return there. That the legislature, having this former object in view, for some time attempted to carry it out by appealing to the charity of the parishioners, by instituting collectors for the poor, and arming them with such power as religious and moral influence could give; but these in their turn being found ineffectual, authority was given to the civil powers to make an order upon the person contumaciously refusing to contribute, and then the next step was taken, and a general assessment to the relief of the poor was instituted by the Act of Elizabeth. All legislation ceased there; for, at the very session of Parliament at which it was passed, the first growl of the coming storm was heard,—the first spark of that spirit which was afterwards to light up a civil war flashed forth. Elizabeth, as Hallam tells us, retired from the struggle, and when the Commons resented her interference in a money bill, she declined the contest. James I., as we know, struggled through his reign the best way he could, with what money he could get; being the English Solomon, he was prepared to, and always did, argue the point with such of his Commoners as would listen to him; but his pugnacity went no further. Charles succeeded, and we know with what result. Of course, while John Hampden was stirring up all England on the question whether he was liable to contribute to the Royal Exchequer 20*s.* for ship-money, there was very little attention paid to the wants of the pauper, whether a sturdy valiant beggar or one really destitute. All further legislation was thus arrested. And such as it was it remained, and on the Act our system of parochial relief has been built,—a system which no Government has been bold enough to interfere with since.

In the discussion that followed, Mr. Ryde said that the statute of the 43rd Elizabeth was one of the best Acts of Parliament that the Legislature in its wisdom ever passed, considering the length of time which has passed, and that no material alteration has since been made in it. Mr. Chatfeild Clarke thought that the operation of the Poor-law was most inefficient, and failed to provide adequate relief in the greater number of cases with which it attempted to deal. As demonstrated in the present day, it was inefficient to relieve the necessitous poor, and was doing an immense deal of mischief in its dealing with the number of cases of chronic vagrancy and half-pauperism. We have utterly failed, he said, to deal with this subject. The chairman (Mr. Clifton) was of opinion that the labour test, which was in operation in the reign of Henry VIII., was a very advisable thing. With regard to dealing with the poor, he said that in Holland the law was very strict as to vagrants. If a man is found begging, the first thing to do is to teach him some useful trade. If he is again caught begging, he is physically punished; and by the effectual mode in which beggars are dealt with, very few of them are seen by travellers in that country.

ORGANS IN CHURCHES AND CATHEDRALS.

SIR,—In the course of a paper read the other day before the Institute of Architects, part of which you did me the honour to print in the *Builder*, some remarks were made in reference to the unsatisfactory way in which the organ is commonly placed in modern churches, in regard to musical effect, by being penned up in a small chamber in one corner of the building. It is still more to be regretted that this system of hiding the organ out of the way, as if it were something to be ashamed of, is being extended to our cathedrals, and that upon very high architectural authority.

In a letter to the *Builder* some time since (July 2, 1870), I called attention to the plan proposed by a distinguished architect, in restoring and re-arranging one of our existing cathedrals, of cutting up the organ into pieces and placing it up and down in the triforium and in the choir aisles. In the very interesting report upon the intended Edinburgh Cathedral by the same architect, printed in your last number, the same system is definitely proposed for the treatment of the organ in this new structure, in the following paragraph:—

"I have provided for the organ in this manner: the lighter parts, especially the choir organ, with the keys and the organist's seat, I have placed close to the first bay on the north of the choir; but the larger and more cumbrous parts I have placed in the eastern aisle of the north transept, immediately behind, a place where the sound would spread itself freely through both choir, transepts, crossing, and nave. The communication would be by trackers passing beneath the floor of the aisle. There is, however, the possible alternative of placing the organist and choir organ, &c., as already mentioned, but placing the heavy parts in the triforium of the choir and transept."

Now, sir, every organ-builder and every organ-player knows that such an arrangement as is proposed here cannot be satisfactory for an organ, so far as musical effect is concerned. The second alternative, of placing parts of the instrument in the triforium of the choir and transept, would allow the best chance for individual pipes or stops to make themselves well heard, though they would be somewhat too high up; but such an arrangement would necessarily entirely destroy the homogeneous effect of the instrument, by cutting it up into parts and making it speak in different directions. But the other position, in the transept aisle, is quite as undesirable, as indeed seems almost self-evident from a glance at the plan of the cathedral; for it has certainly an odd look to see something on the plan labelled "grand organ," and hidden away in the remotest corner of the building, which is, in fact, the case. The arches of the transept aisles are about 27 ft. high to the apex; and as the organ placed in such a building would, no doubt, be a large one, it would be as effectually boxed up and injured in effect as the smaller organs are in the smaller "organ-chambers" of our modern parish churches. It is totally out of the question to suppose that anything worth calling a "grand organ" could realise a "grand" effect when placed in such a position. If the organ in such a case were to be in the transept at all, it should, to enable it to speak out properly, be in the principal aisle with plenty of space above and around it, and this would not be at all a bad position for accompanying the singing of a congregation seated in the nave. Or it might be divided into a north and south organ, and placed in each transept, the instruments to be used together or separately at discretion, which might be accomplished easily by applying the electric movement instead of the ordinary "tracker" system. The old position over the choir screen is, for musical effect, about the most satisfactory which the instrument could have, but this increased size of modern organs is, no doubt, a difficulty in regard to this situation. I believe, however, it would be quite possible to place the larger (pedal) pipes lengthways under the floor and within a portion of the choir screen, and thus to reduce the portion placed aloft on the screen to more reasonable proportions, without materially separating the two parts of the instrument. But probably the best possible position for the grand organ, both for musical effect and for combining with and assisting congregational singing, would be the west end of the cathedral, where the instrument could be arranged in two blocks or towers on each side of the west doorway and window. This position would lend itself very well to architectural effect in the treatment of the organ-case, which would not interfere with the view of any important part of the building; the instrument would be so placed that the sound could freely expand in the direction in which it is wanted, and would be confined by no intervening walls or piers; and it would be possible to support the voices of the congregation, in those parts of the service in which they joined, without drowning those of the choir, who would be accompanied by the small choir organ placed close to them, as already suggested in the architect's report. There would probably be no obstacle to placing the two instruments, by electric action, under the control of the same player, who would then enjoy an opportunity for regulating and combining the musical service of choir and congregation, such as no cathedral organist has hitherto possessed. If such a scheme were found, however, to entail more expense than might be judged desirable, at least the organ should be placed in an open and (as far as possible) in a central position, and not in an aisle or corner of the building. The feeling of modern church architects seems to be, to get rid of the organ as much as possible, as an impediment to the architectural effect. Surely it would be more reasonable to recognise the fact that larger organs are built now than were formerly placed

in English cathedrals, and to provide for them accordingly, and make them a part of the architectural design, rather than to evade the difficulty by placing an organ where it never can have its proper effect.

Of course, the present remarks are made merely from a musical point of view, and are not intended to be taken as in any sense a criticism of Sir G. Scott's plan, architecturally regarded. But the pointed reference to the proposed position for the organ in his report, naturally suggests a word on the subject, in the interest of those who have most to do with organs practically, especially as organists and organ-builders probably do not in general read architectural papers much, and are commonly not aware till it is too late that the chances of the instrument being well placed have been sacrificed by the architect, as in nineteen cases out of twenty they are. The case of the proposed Edinburgh Cathedral only differs from that of most other modern churches in that the building is a larger and more important one, and the organ to be erected in it will probably be a large and valuable one; if so, and if it is placed in the position at present proposed, there can be no doubt that half its value and half its effect will be thrown away. In placing larger organs in existing cathedrals, such a disadvantage of position may in some cases be unavoidable; but surely the building of a new cathedral is an opportunity for securing something more satisfactory than this kind of make-shift arrangement.

H. H. Statham.

THE TRADES MOVEMENT.

Builders' Labourers at Lambeth Baths. — A meeting of labourers has been held in the Lambeth Baths, New Cut, under the auspices of the General Labourers' Amalgamated Union. There was a large attendance. The chair was taken by the Hon. Auberon Herbert, who was supported by the Rev. G. M. Murphy and others. The chairman said he must congratulate them on what they had done. He objected to strikes, but he knew that sometimes they were necessary. He urged them to be careful before resorting to extreme measures. By uniting together they made themselves powerful, but they should be careful how they used their power. By uniting together they might obtain better and cheaper food, they could have their own clubs, their own libraries, and obtain every opportunity of improvement and instruction.

The following resolution was carried unanimously:—

"That this meeting, composed of labourers in the building trades, having sent a respectful memorial to the employers in September last, asking for an advance which would bring their wages from 5d., and in some instances, 5½d., to 6d. per hour, and having given six months' notice of the same, which expires in March next, instructs the executive council of the Labourers' Union to take such steps as they think necessary to insure this legitimate claim of the workmen, and especially requests that all conciliatory means should be adopted before any extreme measures are resorted to."

Another resolution, in favour of the release of the imprisoned gas-stokers, was also passed.

The Leamington Builders' Association have met to consider a demand made by the operatives in all the branches of the trade for shorter hours and increased wages after the 25th March. It was unanimously resolved that the present state of the building trade, coupled with the increased price of all materials, prevented the possibility of the terms of the men being conceded, either with respect to hours or wages. The secretary was directed to communicate the decision of the masters to the trade council, representing the operations in every branch of the trade.

Operative Painters' Union, Birkenhead.—The biennial conference of this union has been held at the Crown Hotel, Conway-street, Birkenhead; Mr. Hewitt in the chair. The report of Mr. Sharples, the general secretary, which was read, stated that the union was financially in a much better condition than on any previous meeting. During the past year sixteen new societies had been formed in connexion with the general union, several of them being in the neighbourhood of Birmingham and the Potteries. Mr. Sharples recommended the members to give their attention to the provisions of the Trades Union Bill, and make every endeavour to secure its repeal.

Workmen's Demands.—A number of hammer-drivers in the employment of Messrs. John Brown & Co., armour-plate manufacturers, Sheffield, have been dismissed from their work for demanding to be paid full scale of wages when the hammers were idle from accident or other cause. It is supposed that the firm will be able to obtain men to supply the vacant places, though the hammer-drivers are entreated by the men who are out to keep away from the town.

SANITARY AND SOCIAL MAXIMS.

More hints on health we here epitomise,
For youth and age, for wise, and otherwise.

Destroy the cause, you cure the evil.

A house without a drain,
Is like to be a house of pain.

Neglect your health and you neglect *your* business.

If the room be damp, light a fire;
If always damp, pray retire.

Keep no secret to the injury of your health.

Wearing your broad-cloth
Will prevent the moth.

Look up the past character of your home, as you would that of your new servant.

Let the pump run dry
Where a cesspool's nigh.

There is only one natural death, all others are unnatural.

As the crow flies
Should the man rise,
Moving straight to
The goal in view.

The way of right,
Is "a right of way."

Captured lock-pickers sometimes plead guilty; brain-pickers never.

No broken leather
In any weather.

Clean in home, clean in person.

Never take things for granted:
Provide for what is wanted.

Bad food, bad blood.

Habitually lazy, habitually criminal.

A street crossing, a street danger.

Through jumping at conclusions
Come most of our illusions.

Houses "built to sell"
Are very seldom built well.

Snub the child, spoil the lad.

A breach of faith
Is a serious scath.

In quenching your thirst don't drown your senses.

Live in a hovel,
You're prone to grovel.

The rich are poor if poor in health,
The poor if healthy have real wealth.

STATE OF THE CAMDEN-ROAD.

Sir,—Would you permit me, in a few words, to state a grievance in your columns, as this may be the surest means to its remedy? The Camden-road, N.W., in which I reside, is the highway by which the cattle collected in the New Market are distributed to the purveyors of beef and mutton. It is also a highway for human beings, and was for their convenience first designed and carried out. The mid-portion of the road has for some time been given over to omnibuses and tram-cars. The cattle, therefore, goaded on by the drovers, rush helter-skelter through any vacant channels left open by the dominant public conveyances, and, without respect to passengers or pavement, tear along, to the terror and confusion of women and children, who fly for refuge into the gardens, and close the gates of the villas, where these are fortunately open. This you will, perhaps, say, sir, is very fussy and silly of us. That we ought to have more presence of mind, and open our umbrellas or parasols, as it is somewhere related a lady once did, in the face of the beast. But we have not the courage of that lady, in this district at least; and I have often seen the strongest sex trying to look cool, and keep an even state when a herd of cattle on the stampede has been behind them—the drovers swearing, the cattle lowing, and the dogs barking, —and even they have sometimes to dodge an infuriated animal, or take shelter. But I find I am going off, like all my sex, into the minutely descriptive; whereas I only took up my pen to suggest, that the authorities should fence the pavement with iron posts and rails along the Camden and other roads similarly circumstanced.

An Unprotected Female.

SAXON CHURCH AT BRADFORD-ON-AVON.

Sir,—As it was by you (Aug. 22, 1857) that the first decided opinion was given as to this ancient church being clearly a pre-Norman structure, you will, I hope, give me the opportunity of drawing attention to an advertisement in your columns respecting our efforts to recover and ultimately restore it.

We have waited for many years in the hope of preserving this precious relic of former days. Matters were complicated by the fact of the chancel and nave belonging to different proprietors.

An opportunity offering a few months ago of purchasing the chancel, I at once embraced it. Our Wiltshire friends have since supplied the funds.

We have now a chance of obtaining the nave. But, in addition to present subscriptions, we want at least 300*l*. Then, we hope, will follow the restoration, which will cost 500*l*. more. So that we want some 800*l*. in all.

Two of our greatest living authorities have, after careful examination, pronounced it to be *unique*,—"the only one perfect surviving Old English church in the land, and possibly in Europe."

In the name of the trustees, I venture to ask earnestly for help in this our effort permanently to preserve so invaluable a memorial of the past.

W. H. Jones (Treasurer),
Prebendary of Sarum, Vicar of Bradford-on-Avon.

HOW TO PREVENT DAMP FROM ENTERING INTO STONE.

Sir,—Permit me, through your valuable journal, to give to the public a piece of information which they have long been inquiring after. Many have asked the question, how can we prevent damp from entering into stonework? and some have asked if it is possible to prevent vegetable substances from growing upon stone. The following ingredients melted and mixed together and applied while in a hot state to the surface of the stone will prevent all damp from entering into it, and also those vegetable substances from growing upon it:—1½ lb. rosin, 1 lb. Russian tallow, 1 quart linseed oil. This simple remedy has been proved upon a piece of very porous stone made into the form of a basin, and two coats of this liquid being applied, caused it to hold water as well as any earthenware vessel.

William Cross.

RE BUILDING ACT.

Sir,—Dr. Little, in his paper "On the Sanitary Defects of the Building Act," seemed desirous that the parish surveyors should administer, and the local boards control, the Act.

I have no hesitation in saying that if this were carried out no greater mistake could be made, and no better arrangement for destroying the surveyor's independence could well be devised, inasmuch as the members of the local boards are mostly owners of small house property, and are very testy if their rights, as they call them, are interfered with.

That professional appointments should be made by an independent body (now the case with District Surveyors by the Metropolitan Board) is felt very strongly throughout the country, and formed one of the requests, a few days since, of the deputation that waited upon Mr. Stansfeld in reference to the management of highways and other matters.

I have said that professional appointments by local boards are bad, and will give one of many illustrations of the reasons why I think so. Soon after I was appointed to a district I had occasion to serve a formal notice for irregularity on a member of the local Board. A day or two after I met the individual in question, when the following dialogue took place:—

M. L. B.—You are our new district surveyor?

D. S.—I am.

M. L. B.—I have received a notice from you to alter the footings of my buildings.

D. S.—Yes.

M. L. B.—Do you know, sir, that I am a member of the board of works?

D. S.—No, I hear it now for the first time; but as I find that to be the case you are in the position of one who should teach the public how to observe the law, and not show them how to break it, by using your official position as a shield. I have to inform you that unless you correct the mistake forthwith, I shall proceed by summons in forty-eight hours.

The effect was marvellous, the work was correctly done; and ever since when we meet he very properly "doffs his castor." Now, what would have been my position had he been one of my masters? In fine, I would say a public officer, whether he be a district medical officer or district surveyor, cannot avoid treading on the toes of some one in his district, if he does his duty; and if these somebodies have the power they will not fail to let him know it, and if his income is an object interests will clash: therefore I have come to the conclusion that such officers should be appointed by the central authority.

EXPERIENTIA DOCET.

ACTION FOR TRESPASS, &c.

CLIFTON *v.* GLAVE.

In this action, before the Lord Chief Justice Cockburn, the defendant pleaded not guilty under the Metropolis Building Acts.

The plaintiff, who was a widow, carried on business in New Oxford-street, on premises which formed part of the Arcade, as a perambulator and invalid-chair manufacturer. The defendant was a draper, occupying the whole of the other portion of the Arcade premises. Disputes had taken place between the parties as to whether a wall, with a shop-window looking into the Arcade, which window had been in the possession of Mrs. Clifton during the whole of her tenancy, was a party-wall or not. The defendant sought to block it up, as he was desirous of adding the Arcade to his other premises to make further shop accommodation, and he gave notice under the Metropolis Building Act of his intention to block up the window. The plaintiff, through her attorney, disregarded the notices. On the night of Feb. 16, 1872, the plaintiff and her family were aroused by a loud knocking, and on her coming down to the shop, she found the defendant, with his shopmen and carpenters and bricklayers, to the number of thirty, taking down the shutters. She remonstrated with him, but to no avail. The shutters were taken down, the sashes were cut, and the plate-glass taken out and carried away. A number of bricks were passed from hand to hand, and the bricklayers bricked up the aperture. The defence was that the aperture in question had been made in the party-wall; that the defendant had a perfect right to insist upon its being built up; that he gave the required notice; and that he had it built up at night in order not to interfere with the day business.

Eventually, and before the case was concluded, the parties agreed upon two sums, which were handed up to his lordship to arbitrate between them.

Lord Chief Justice Cockburn said, he had no hesitation in awarding the largest sum, because the course adopted by the defendant was an unjustifiable proceeding.

Some matters of detail as to the future were then agreed to by the parties, and, in addition, a money verdict was taken by consent for the plaintiff—Damages 200*l.*

ARCHITECTS TAKING OUT THEIR OWN QUANTITIES.

SIR,—Will some of your numerous readers kindly inform me if it is the practice amongst architects now to take out their own quantities? I have a bill sent me which I decline to tender upon, for the following reasons:—first, as a member of the Builders' Society, I am, by agreement with the R.I.B.A., precluded from taking other than quantities supplied by an independent surveyor; secondly, the gentleman who has forwarded them to me is a Fellow of the above Institute, and the charge made is 2½ per cent., which sum I know is excessive, considering no labours of any kind are taken in the bills, simply cube stone, &c. How ought builders to act in such a case as this? I might add, the quantities are in manuscript.

A BUILDER.

STROUD GENERAL HOSPITAL COMPETITION.

SIR,—I trust that the committee of the above may be rewarded with a crowd of designs in answer to what I may be allowed to call their ridiculously liberal offer of premium. Ten guineas! Ten pounds ten shillings! and for what? Why, sir, for nothing; for a mere flea-bite of work; for a hospital to accommodate twenty-four indoor and sundry out-door patients, for surgery and consulting-rooms, for residence for house surgeon and hospital staff; the whole of which will not cost more than 4,000*l.* Why, sir, this fatuously lavish committee is actually offering more than one quarter per cent. for this paltry amount of work. To be sure, there is to be considered as a set-off against this,—the fact that only one, and possibly none, of the designs may be premiated; but when one goes in for a good thing, one does not care for an insignificant risk.

Now, sir, my object in writing to you is to point out what I consider to be a serious financial blunder on the part of the hospital authorities. There is no charge made to competitors for the plans and sections of the site. This must be considered a most culpable oversight on the part of men who should watch with jealous care the interests of the subscribers, and demonstrates most clearly the almost criminal prodigality of their actions. If a small charge of, say 5*s.* each, had been made for these particulars, as much money might have been made as would have paid the premium, and if the committee had chosen afterwards to withhold it, here would have been a nice modest little sum honestly earned, which might have been added to the funds of the charity. In the interest of the hospital, I ask whether you think it would now be too late to rectify this blunder?

CHARLES TUKE.

SIR,—I understand when the form of advertisement for this competition was framed, a motion that a larger premium should be offered, and the successful architect employed, was lost. It is also the opinion of a member of the committee that the buildings could be carried out very well by a clerk of works, without the aid of an architect. In justice to intending competitors, I trust you will have the goodness to insert this letter.

ONE WHO KNOWS.

BUILDERS, HOUSE DECORATORS, AND HOUSE AGENTS.

Smith v. *Cook*.—This action, in the Marylebone County Court, is one that is likely to crop up in a wide field of litigious oats, consequent upon house agents turning their pursuit into that of builders and house decorators, and builders, by way of retaliation, taking upon themselves the business of house agents. Builders at the West End in an extensive way have now in their windows, not only the old auctioneers' slips of estates to sell and let; but old-established house agents and auctioneers, on the other side, take in orders for rebuilding and repairs, although, as a rule, knowing nothing whatever of architecture, surveying, or even the size of a brick.

The consequence of this competition is generally an appeal to a County Court Judge, who cannot be expected to be posted in estimates, prices of materials, wages, and so on. It also usually occurs that each side bring witnesses who directly contradict each other in all matters that the judge or jury require to be enlightened on. The counsel and solicitors in the cause make the fog denser, and, it may be added, the truth is more an exception than the rule.

In the present action, Mr. Smith is a house painter and decorator, of Tavistock-crescent, Westbourne Park, and sued the defendant, who is a resident of Swindon, for 16*l.* odd for commission, in regard to letting a house in Leamington-road, Bayswater.

From the evidence of Mr. Smith, it seems that he was employed to repair the house by the outgoing tenant, and afterwards became the agent for letting the premises; and he introduced a tenant, a lady, who was accepted by the landlord, the defendant; and for this agency he claimed the sum referred to.

The Judge felt a difficulty in deciding the claim, and appealed to Mr. Clarke, the solicitor for the defendant, if it were not a case for a compromise; and eventually a verdict, by consent, for 5*l.* was agreed to; and the judge, Mr. H. J. Macnamara, observed that he was relieved by a satisfactory termination.

OLD HOUSE, ENFIELD.

SIR,—A friend has pointed out to me that both Mr. Andrews and myself have mistaken, in Mr. Wilson's letter on the above (referred to last week), the word "Mansion House" for "Manor House." Kindly allow me to correct the mistake.

TH. B.

WORKMEN AND THE FOREMAN.

SIR,—On reading a letter in your impression of the 25th ult., under the title of "A Foreman's View," and knowing that you always take an impartial view of every question, I think it but justice to our trade to say a few words in reply, as the world might be led to believe we are not what we profess to be,—that is, mechanics capable of doing a fair day's work for a fair day's pay, and that we are all governed by societies and their rules.

I have worked for several London firms, and under several different foremen, and quite coincide with your correspondent of the 11th ult. on the inability of the generality of the masters' representatives. The way in which "A London Foreman" vindicates the character of his class is not, in my opinion, quite so creditable as it should be,—by running others down to justify himself.

He states that, as soon as a job is started, or about to start, all the societies know all about it, also the characters of the masters and foremen; and I ask, why should they not know? Has not one man a right to know the character of the other to whom he is about to sell his labour, and also the character of the one by whom he is to be governed or controlled? If they are conscientious and upright men they will not be ashamed of being known by either society or non-society men.

Then again, with regard to the batch (which your correspondent would lead us to believe are all *loafers*) that apply first: surely there are some good men to be found among them. They are not all bad; yet how often do we find that the *muff* (if I may borrow the term) is kept on, and the good man discharged. For why? Because of that system which, I am sorry to say, is, and I am afraid always will be in existence,—I mean, the tipping or feeing of the foreman, which is one of the greatest disgraces to our trade. Of course, there are many exceptions, and it would be injustice to say that all foremen are alike.

Now, about the *muff* staying long enough to spoil a good man, or one intending to do a good day's work. May not part of the fault rest with the foreman as well as the muff? I would ask your correspondent, how often does the man go and make a few simple, yet necessary, inquiries, and get snapped at as if he were one of the brute creation (which, of course, betrays ignorance)? And is not that enough to spoil his former good intentions, and make him not only disgusted with the job, but also with the man whom he is under?

I can assure you, sir, I have known several instances of this sort, and where the man was really a better and more competent person than the one over him. If your correspondent would look to this part a little, I do not think he need fear the muff spoiling a good man, or any difficulty in obtaining men to do his work, although I should be very sorry to dictate to him.

There are some foremen who get their work done and are respected by the men as well as the master, although they have the same difficulties to contend with as "A London Foreman"; and how is it? Why, simply because they act impartially, and do unto others as they would be done unto.

A JOINER.

"I KNOW A HAWK FROM A HANDSAW."

SIR,—I have been much interested by the ingenious interpretations, by several of your correspondents, of this well-known passage. None seem to me so like the author's evident meaning as the indignant repudiation of ignorance of the distinction between two birds somewhat similar in kind. It is, I think, the reading adopted by Mr. Barry Sullivan, and reads thus:—"I know a hawk from a heron. Pshaw!" Having heard it read with the proper emphasis, I was convinced it must have been the real intention of an author most of whose figures of speech are peculiarly clear, forcible, and apt.

Dublin. WM. STIRLING.

SIR,—I should deem myself wanting in respect for your many courtesies if I passed this matter unnoticed.

The word *hanser=heron* needs confirmation. I do not find it in Halliwell's Dictionary of Archaisms and Provincialisms, or in Bailey, or such other authorities as come within my reach. Your correspondent quotes no authority, and this point will have to be made clear.

I do not *deny* the word; but "hanser" looks very like *anser*, the Latin for "goose." Norfolk is famous for Michaelmas poultry, and for other things.

But, supposing "hanser" to be a genuine word, it might be corrupted from "haleyon," the kingfisher; and even if ultimately proved to be a corruption of *heron-ceaux*, let me remind your correspondent, with all due respect, that "hanser" is not *handsaw*.

A. H.

HIGHWAY DISTRICT SURVEYORS.

SIR,—In your impression of last week I observe an article headed "Sanitary Engineers and the Government," in which it is stated that a deputation of *Local Board surveyors* waited upon Mr. Stansfeld, &c. As one of the said deputation, allow me to state that the deputation consisted of five members of the *Highway District Surveyors'* Association, representing upwards of 130 highway districts, situated in all parts of England. Highway district surveyors are appointed under 5th & 6th Wm. IV., cap. 50, and 25th & 26th Vict., cap. 61, an Act that does not apply to *Local* Boards. I may here mention that the Association is of long standing, and numbers about 150 members, its great object being the introduction of more efficient men as surveyors to districts. That this is necessary you will understand when I state that the districts are composed of from four to 160 parishes, with a superficial area of from 10,000 to 80,000 acres, and a length of roads varying from 40 to 800 miles; and as the sole charge is vested with the surveyor, you, Mr. Editor, will understand that he should be a competent man. The duties include the reconstruction of various bridges, embankments, sewers, and other improvements; and as nearly the whole of the *old* bridges (mostly timber) have (or will shortly have) to be reconstructed, you will at once see the class of men required. I shall be most happy to give any further particulars as to our Association, and earnestly solicit the support of our brother surveyors.

ONE OF THE DEPUTATION.

ENLARGEMENT OF BRIXTON PRISON.

WITHIN the last few months the convict prison on Brixton-hill has been undergoing very extensive alterations and enlargement, the interior having been almost entirely reconstructed. The old treadmills, to which in past years prisoners were sent for hard labour, have been altogether removed, and in their place a large number of workshops adapted to almost every description of handicraft and trade, have been erected, and in future convicts sentenced to penal servitude, and different periods of imprisonment, will have to work at the trades which they may have respectively followed. A considerable number of experienced warders from other prisons have recently been drafted to the Brixton establishment, and are now engaged in superintending and teaching the prisoners various trades in masonry, carpenter work, smith's work, shoemaking, tailoring, and other branches of employment, the result being that a large amount of work is now daily turned out, and the labour of the prisoners realises a considerable return. Amongst other articles produced, the boots of the metropolitan police-force are now manufactured at the prison. Insubordinate and obstinate prisoners are sent to Chatham Dockyard. The alterations which have been made in the building have been carried out by the prisoners under the superintendence of the prison authorities.

PICTURES FOR THE LONDON INTERNATIONAL EXHIBITION, 1873.

A MEETING of noblemen and gentlemen has been held at Marlborough House, presided over by the Prince of Wales. The object of the meeting was to create a permanent organisation for promoting the exhibition of the best modern British pictures upon a system somewhat similar to that successfully pursued for more than half a century by the British Institution. General Scott read a memorandum. It is proposed in the International Exhibitions to collect only the works of contemporary painters in oil and water colours. This is a field of action which is not covered by any existing institution.

General Scott explained that the Exhibition of 1873 would consist of:—(A) Paintings in oil and water-colours which have been executed since 1863, and have been exhibited at the Royal Academy, the Water-Colour Society, and similar established societies, contributed direct by the artists or by proprietors. (B) New works submitted for the first time for exhibition. (C) A representation of the works of John Phillip, R.A., who died in 1867, and of Thomas Creswick, R.A., who died in 1869 (for this a special part of the Exhibition Galleries will be assigned). (D) A collection of paintings in water-colours by artists who have died since 1863 (for this division a special part of the Exhibition will be assigned if found to be desirable).

The Marquis of Westminster expressed his willingness to act on the committee, and to lend pictures; and several gentlemen spoke in the same sense. A general feeling was expressed that the proposed limitation of ten years was too short, and that it ought to be extended to at least twenty-five.

"ENGLISH ARTIZANS FOR ATHENS."

IN consequence of our paragraph on this subject (p. 84, *ante*), we have received eight letters from artizans expressing desire to go to Athens, and asking for introductions to Mr. Watson and answers to various questions. Mr. Watson is the representative of this country in Athens, and his report is an official one. We cannot attempt to go any further into details. We simply stated the general opinion at which he has arrived, and persons disposed to go would have to obtain such information as they could, and act on their own responsibility.

Our Foreign Office would probably give some additional information if applied to.

THE COAL QUESTION.

GOOD will no doubt come out of the evil of the coal famine. An impetus has been given to coal-cutting by machinery, for one thing. The proprietors of Hetton Colliery, after having tried various coal-cutting machines, have adopted the patent of Messrs. Baird, of Gartsherrie Ironworks, in Scotland. The machine is driven or actuated by compressed air, worked at a pressure of 45 lb. to the square inch. For something like a year one, and the only one of these machines yet in operation, has been at work in Gartsherrie Colliery, where it has been seen by many scientific and practical men, including not a few members of the Iron and Steel Institute of Great Britain. The machine can cut 350 ft. of coal per night of eight hours, thus yielding from 70 to 75 tons of coal, or a production equal to that of forty men. Only three, or at most four men are required to look after it. The compressed air is brought in cast-iron pipes to the machine, which is upwards of 300 fathoms from the pit bottom. The revolution of an endless chain gives motion to the coal-cutters, nine in number, and an ingenious arrangement enables the machine to propel itself along the face of the seam. The proprietors of the Hetton Colliery are the first, after the Gartsherrie firm, to resolve on the adoption of these machines. It is estimated that the total number of people employed in and about the coal-mines of this country is pwards of 360,000; and by the universal adoption of the Gartsherrie machine it is estimated that the odd 60,000 would be almost sufficient to raise the 120,000,000 tons of coals which are now annually produced in Great Britain. The use of compressed air also gives improved ventilation in the mine, and the use of the machines reduces the waste from 12 to 4 per cent.

Another machine, which is likely to be brought immediately into prominent use, is Clayton & Co.'s patent for the condensation of peat turf into fuel-bricks, almost as dense, it is said, as coal. It is proposed to utilise the great mosses near Dumfries, and so convert them into rich arable land, while reaping a valuable crop of fuel as the first-fruits. Even were coal as cheap as ever it was, it is said that this will be a highly profitable process. The total cost of production is stated at 5s. a ton.

ARCHITECTS' LIABILITIES.

IN reference to the letter of "M. H.," on this subject, I think there need be no hesitation as to whom the liability rests upon. If the plumber has not complied with the contract entered into by him, he can be prosecuted for fraud. If the architect prepared a proper specification, and gave a reasonable amount of superintendence, he has done his duty; he is only remunerated by a small commission,—the tradesman receives a *profit*, and thereby becomes a responsible party. It is too much the fashion for clients to aim at obtaining eighteenpence for a shilling, and let their work get into the hands of unscrupulous men, who would evade their duty if even the architect spent the whole of his time upon the works. I think there is a great want of explanation in the scale of charges issued by the Institute, as no mention is made of the amount of attendance supposed to be included in the 5 per cent. commission, although charges for *extra* attendance are named. The only remedy against bad work is to employ tradesmen of known character and ability, and allow them a fair remuneration. It would be impossible for an architect to be certain of the quality of many of the materials used in the building without applying chemical and other tests, which would involve such an amount of labour and expense, that he would be better without the commission.

I have myself gone very deeply into these matters, and the more I do the more is expected. Clients have purchased materials, and employed jobbing hands with no experience, and considered it my duty to act the part of a builder's foreman (without extra pay of course). In works of magnitude, and at other times, when opportunity offered, I have tested a variety of articles, and having pretty well ascertained where I can depend upon having the genuine thing, I frequently give the names of the manufacturers from whom I desire the articles to be obtained; but without a clerk of works this cannot be properly enforced. There is no material more adulterated than paint, yet how is an architect in the ordinary course of his duty, to ascertain that he is not cheated? Frequently the workman himself does not know; the appearance of the work does not show it,—it is time that proves it.

I have tested specimens of white lead (the foundation of most paints), and the quality called "Best" in the trade I have found to contain 30 per cent. of adulteration; the same with cements, and many other things. Before an architect can be saddled with responsibility, it must first be shown that he has not given proper directions, or a reasonable amount of care in supervision; in addition to which it should be borne in mind that there are plenty of contractors who would rob their employers if every workman had a policeman at his elbow. Builders, as a class, have degenerated, and the cause is attributable to the employers alone, who have taught them dishonesty in inciting them to take work at less than cost price. Z.

THE NEW NORTH BRITISH RAILWAY SLEEPING-CAR.

THE new sleeping-carriage, specially constructed for the North British Railway Company by the Ashbury Railway Carriage Company of Manchester, has been tried on the North British system between Glasgow and Edinburgh. The carriage was attached to the express train leaving Glasgow at 1 p.m., and reaching Edinburgh at 2·25. The carriage is 30 ft. long and 7 ft. 6 in. wide, outside measurement, and 6 ft. 10 in. from the under side of roof to the floor in the centre inside. The body of the carriage is divided into one second-class compartment at one end, and a luggage compartment at the other end; the centre portion being fitted up as two first-class saloon compartments, with communicating lobby between them, on one side of which lobby a lavatory, and at the other side a watercloset are provided, a water-tank on the roof giving supply for both. The interiors of the first-class compartments are panelled on the sides and roof with silver walnut wood, with mouldings of ebony and gold. The seats and backs are trimmed with crimson velvet, on a basis of spring mattress, with sofa springs and horse-hair stuffing. The seats and backs, three in each compartment, are by a simple arrangement made so that the seat will fold up, when the back, by a slight pull, comes forward and falls down, forming a comfortable bed 6 ft. 3 in. long, with pillow or cushion. This, when not required, by a very slight lift, is replaced in its original position, and the seat again resumes its usual form, as in a first-class carriage. The whole of the furniture and mountings in the first-class compartment, outside and inside, are silver-plated. The carriage can be ventilated as required, at the bottom or top, by movable louvres and slides, and is carpeted with pile carpet on a layer of kamptulicon.

DIOCESAN TRAINING COLLEGES FOR SCHOOL MASTERS AND MISTRESSES, DURHAM.

HANDSOME voluntary subscriptions have been raised in the diocese for enlarging both these colleges; the former at present contains accommodation for forty-six students, and it is proposed to enlarge it, so as to accommodate in all seventy students, at an estimated outlay of 2,500*l*. The latter has now accommodation for forty-six students, and this building will be enlarged so as to accommodate twenty-four more students, or seventy in all, at an estimated cost of 3,000*l*. The latter work has been already commenced, and the former will shortly be so.

Mr. William Crozier, county engineer and architect, has been appointed architect for both works.

DR. BORLASE.

SIR, — With reference to this Cornubian author and his early residence, I have visited it recently. It is a curious specimen of seventeenth-century domestic architecture, I think; and in the innner courtyard a platform or rostrum may be seen, from which Samuel Wesley addressed the people when he was in Cornwall.

In Mr. Blight's "Week at the Land's End" there is a view of this old manor-house, as seen from the south, which is an accurate sketch of the building. It is only a few miles from St. Just, in Penwith, at Pendeen, and close to the sea. Near the house is a long underground gallery or cave, described by Dr. B., in his work upon the antiquities of Cornwall. Mr. Blight's work, above mentioned, contains also an engraving of a curious old house at Newlyn, near Penzance, now or formerly the "Keigwin Arms," which I have seen. It merits the notice of antiquaries, as does the old house of Kenegie, near Penzance. CHR. COOKE.

Miscellanea.

A New Industry in Tasmania.—The commencement of iron-mining in Tasmania seems likely, says a Launceston paper of Tasmania, called the *Cornwall Chronicle*, to open up a variety of industries. Messrs. Harrison & Just have patented here and in Victoria and the other colonies an invention by which asbestos is likely to be turned to very profitable account in the manufacture of fire-clay and fire-clay articles. The incombustible character of asbestos, and the refractory nature of the serpentine rock in which it is found, attracted the attention of Dr. W. H. Harrison, and the necessity for securing large supplies of refractory fire-bricks suggested to him the possibility of combining the two substances—the one incombustible and fibrous, the other refractory—in such a way as to produce the required article. Experiment is said to have justified this expectation. The material, it is hoped, will also be useful for gas retorts, crucibles, fire-bars, pipes, and other articles besides fire-bricks.

Books on Art and Science.—Our advertising columns contain a further list of important works on Art and general literature published by Messrs. Longmans, Green, Reader, & Dyer. We point to it less for the sake of the publishers than for that of our readers.

National Health Society.—Dr. Hardwicke, medical officer of health for Paddington, has read a paper at the rooms of the Social Science Association, Adam-street, Adelphi, "On Model Dwellings of Workpeople in Towns." Mr. Pennington, the chairman, in introducing the lecturer, dwelt upon the importance of the subject of model dwellings, especially in a country like England, where a larger proportion of the population lived in great towns than in any other country in the world, and in twenty-six towns alone the population exceeded 100,000; and he recommended a royal commission to inquire into the condition of the people in large towns. Dr. Hardwicke, in the course of his paper, said that amongst the various social problems requiring solution, an important one was as to the best manner of effecting a reform in the dwellings of this country, especially among workpeople. The present state of unhealthy dwellings was both physically and morally bad. They endangered health, and were strong incentives to intemperance. It was the duty of Government to avert these dangers without delay. As far as the present model dwellings were concerned, they had never been profitable to capitalists; but objection to them had been taken on account of the external staircase and the deficiency of sunlight. Too much supervision, too, was objectionable. The *familistère* of M. Godin, at Guise, near Paris, gave the best example he knew, showing better than anything else what might be done in the matter of model buildings.

The Want of Additional Dwelling-houses in Nottingham.—At a recent meeting of the Town Council, the Parliamentary Committee presented a report in which they said:—"Your committee consider that there are many cases in which it would be beneficial, both in a sanitary and moral point of view, to allow of dwelling-houses being erected with less than three bedrooms. Your committee therefore recommend that section 125 [of the Nottingham Enclosure Act of 1845] be amended so as to vest a discretion in the Council to allow dwelling-houses to be erected possessing less than three bedrooms above the ground-floor thereof." Mr. Manning remarked that they had passed a resolution whereby thirty-seven poor people were dispossessed of their dwelling-houses, and he was informed there were 600 artizans' dwelling-houses required for the accommodation of the working-classes in the town. There was a clause in the Enclosure Act which prevented very much the building of working men's houses, and therefore the Parliamentary Bills Committee had agreed to the report, the adoption of which he begged to move. Alderman Enfield seconded the motion, and it was carried.

London and County Bank.—The directors at the meeting held on the 6th, announced that after paying interest to customers, and all charges, allowing for rebate, and making provision for bad and doubtful debts, the net profits amount to 104,803*l.* 9s. 6d. This sum, added to 10,634*l.* 11s. 10d. brought from the last account, produces a total of 115,478*l.* 1s. 4d. The directors recommended the payment of the customary dividend of 6 per cent. for the half-year, with a bonus of 4 per cent., both free of income-tax, which would amount to 100,000*l.*, and leave 541*l.* 13s. 4d. as a reserve to meet interest accrued on new shares, and 14,936*l.* 8s. to be carried forward to profit and loss new account, and this was agreed to. The present dividend and bonus added to the June payment will make 20 per cent. for the year 1872. The amount of discounted bills and advances to customers in town and country is 12,099,252*l.* 17s. 5d., and the liabilities of customers for drafts accepted by the bank is 4,243,844*l.* 18s. 7d.,—making a total of 16,343,097*l.* 16s.

The Enlargement of Durham Gaol.—At the adjourned Quarter Sessions for the county of Durham, Mr. Crozier (county architect) said it was contemplated making 102 cells, with six rooms and six workshops underneath, which were much wanted. There were two sets of yard water-closets, and three heating-rooms, where heating apparatus was kept.—The chairman said there was another plan, to carry round the west wing in order to meet the south wing. This would cost 5,000*l.* more. The estimate for the extension of the new south wing was 8,308*l.*, while that for the extension of the west wing was 5,342*l.* The south wing would give 102 new cells, and the extension of the west wing 63. It was resolved "That the magistrates carry out the whole plan, at a cost of 13,650*l.*"

Choke-damp Experiment in the Paris Catacombs.—Captain Denarouze is proving to the *savans* of Paris, that if miners henceforth perish from choke-damp it will not be through the fault of science. His demonstrations to this effect are made in the catacombs, under the Rue d'Enfer. The purpose is to show that, by an apparatus analogous to that for breathing and working under water, the same freedom of movement may be obtained in the midst of choke-damp, or carbonic acid gas, which, in fact, is a kind of water, though invisible, and drowns those plunged in it without protection, just as water does. A "hood and mouthpiece" for protection, with a supply of vital air to breathe, were experimented with in this country between thirty and forty years since; and it is not more than a year or two, we recollect, since the subject was mooted with reference to colliery-accidents from choke-damp in England.

The Manchester Town-hall Contracts.—The Manchester city council occupied a considerable portion of their last sitting in discussing the new town-hall contracts. The subject was introduced by Alderman Heywood, who moved that the course suggested by the sub-committee for the completion of the work, viz., that Messrs. Smith & Sons, the contractors for the mason-work, be invited to send in a schedule of prices, be approved and adopted. The proposition, however, was strongly opposed: it was said that justice would not be done the ratepayers in regard to the contracts unless they were thrown open to competition; and that the amount likely to be saved by public competition would not be less than 50,000*l.* Mr. Mark Price reminded the council that the new town-hall would cost 1,000,000*l.*, which would lay upon the ratepayers a perpetual rate of tenpence in the pound. An amendment was ultimately carried that the remainder of the contract be let by public competition.

Atmospheric Bells for Buildings.—The atmospheric system of communication for houses, hotels, warehouses, factories, and so forth, fitted up by Messrs. Homfray & Co., seems, so far, superior to the electric system, in that when once fitted it requires no further attention; its sending power is constant, thus the disadvantages of defective insulation and the maintenance of batteries, are entirely done away with; whilst the annoyances arising from slack wires, common in the usual crank and wire system, are in this unknown. Instruments with indicating tablets and bell attached placed in any desired position, show the number or name of the room or rooms from which the bell has been rung; the tube or tubes acting as the conductor of air between press-button and the bell can be placed out of the sight, and laid down and soldered in the same way as gas tubing. They deserve the attention of persons building, or tired of the old system.

Improvement of Houses of the Poor.—The special committee formed by the Charity Organisation Society to consider what steps can be recommended with a view to improving the dwellings of the poor throughout London, held its first meeting on Wednesday last, at the central office of the Society, 15, Buckingham-street, Adelphi, under the presidency of the Lord Mayor. There were present, among others, the Marquis of Westminster, Earl Fortescue, Lord Mahon, M.P., Mr. Andrew Johnston, M.P., Mr. Kay-Shuttleworth, M.P., Mr. Eastwick, M.P., Sir Baldwin Leighton, Mr. Liddle, Dr. Ross, Dr. Hardwick, Rev. W. Denton, Miss Octavia Hill, Mr. Godwin, Mr. W. H. Hall, Mr. R. Freeman, Mr. Gilbert, Lord Robert Montague, Mr. Bosanquet, Mr. Gatliff, Mr. Fletcher.

Foremen Engineers.—On Saturday evening last the members and friends of the London Association of Foremen Engineers and Draughtsmen dined together at the City Terminus Hotel, under the presidency of Mr. John R. Ravenhill, C.E. The chairman, proposing "Science," illustrated the practical application of his subject by stating that he had that day received, answered, and received a reply to, a telegram from Egypt; Professor Goodeve, noticing the probable supersession of the use of iron by that of steel, said he had recently seen the latter material manufactured under a pressure of 8,000 tons.

The Royal Gold Medal.—The Council of the Royal Institute of British Architects have resolved to recommend to her Majesty the present president, Mr. Thomas Henry Wyatt, as the recipient of the Royal Gold Medal for 1873.

The British Archæological Association.—On Wednesday night in last week a special general meeting of the Sheffield Architectural and Archæological Society was held at the Rooms, School of Art. A sub-committee that had been appointed to wait on the public bodies of the town, and to communicate with the Duke of Norfolk, reported that the proposal to invite the British Archæological Association to hold its next Congress in Sheffield, met with the most cordial approval. The Duke of Norfolk, through Mr. Ellison, forwarded a letter expressing the pleasure it would afford him to take part in the proceedings if the time of the meeting did not clash with other engagements. A resolution was unanimously passed inviting the Association to come to Sheffield.

Unsafe Landings. — The St. George's, Hanover-square, Vestry have considered a letter from their solicitors (Messrs. Capron & Co.) with respect to the case of the "St. George's, Hanover-square, Vestry *v.* Col. Hamilton" (of Eaton-square), who was summoned before the magistrate at the Westminster Police Court for the expenses of repairs done to the landing in front of his house. Messrs. Capron informed the vestry that the magistrate, finding, under the 226th section of the Act (Metropolis Local Management Act), he had large discretionary powers, had decided to divide the expenses between the vestry and Col. Hamilton. After some debate, the vestry agreed to accept the magistrate's decision.

The Dublin Tramways Company. — The report of the directors to be read at the third ordinary half-yearly meeting, on the 20th inst., shows that the gross receipts from all sources amount to 23,745*l.* 4s. 10d., and after paying all working expenses, there remains a net profit of 7,829*l.* 7s. 4d. available for division, out of which it is proposed to appropriate sufficient for a dividend at the rate of 12 per cent. per annum free of income-tax, leaving the sum of 1,229*l.* 11s. 6d. to be added to the reserve fund. This fund will then amount to 2,458*l.* 19s., of which the sum of 1,229*l.* 7s. 6d. has been invested in Three per Cent. Consols, as certified by the auditors. The account looks healthy and the prospect promising.

Royal Architectural Museum.—Mr. J. F. Redfern will give practical descriptions of the figure sculpture in this Museum on Saturday afternoon, Feb. 22, and the two following Saturdays. Mr. Thomas Peard has promised two addresses on the Art of Producing Artistic Iron Work, on March 15 and March 22. Any may enter free. We would further draw attention to the fact that art-workmen's evening drawing and modelling classes are now in full work in this Museum, at seven o'clock every Monday, Wednesday, and Friday evening, at nominal cost for entry.

Tangye's Wall Steam Engine.—Those who think it better to distribute the steam power required in manufactories over a number of small engines rather than confine it to one large one, an arrangement which has its advantages, will find Tangye's engine well suited for this purpose. Where workshops consist of three or four floors, an engine of 4-horse or 6-horse power can be fixed on the wall of each floor to work the machinery on that floor, quite independent of any other, saving the floor space, as well as the brick foundation required by any other kind of engine.

New School for Bermondsey.—On Monday a new school attached to St. James's Church, Spa-road, Bermondsey, was opened by the Princess Teck, in the presence of the Lord Mayor, the sheriffs, and a number of the clergy and leading inhabitants. The cost of the school was 1,350*l.*, of which 1,050*l.* have already been subscribed, leaving a deficiency of 300*l.* The building is Gothic in design, and consists of one large room and one class-room. The architect is Mr. R. Hesketh; and the builders are Messrs. Downs & Co., of Union-street, Borough.

The Removal of the Snow.—In the Chelsea Vestry the surveyor reported that the snow had been left, by the contractor, in twenty-nine streets. Mr. Fisher moved that a fine of 5*l.* be inflicted in each case, making in all 145*l.* This not being seconded, he then moved to fine for fifteen streets, a total of 75*l.* To this there was an amendment, that the question stand over for a fortnight; but this was lost. Mr. Davidge then moved a fine of 30*l.* for six streets, which was carried.

Sanitary Requirements of Metropolitan Workshops.—At a meeting of the Metropolitan Association of Sanitary Officers, held on Monday evening, in the hall of the Institute, Alderman's-walk, Bishopsgate, a lecture was delivered on the above subject by Mr. Thomas A. Dennis, the chief sanitary inspector of the parish of Shoreditch. He dwelt strongly on the necessity of efficient ventilation and the use of the syphon traps in all cases of sewer drainage, as being the best means of rendering water-flushings effectual when there was a proper supply of that important material.

The Americans and Mr. Bessemer.—The Americans have adopted a novel method of showing their appreciation of Mr. Bessemer's services to science. In the midst of one of the richest iron and coal districts in Cincinnati they have begun to build a new city, which, from its geographical position and local advantages, will probably become one of the largest centres of trade in America. To this city they have given the name of Bessemer.

Pavement of Worcester Cathedral.—Lord Dudley has offered to defray the cost of a flooring of white and black marble to the nave of Worcester Cathedral in lieu of one of stone and slate, and the offer has been accepted by the Restoration Committee. The cost of the marble flooring will be between 4,000*l.* and 5,000*l.* The choir is already floored with encaustic tiles and marbles of various colours.

Glass-lined Pipes.—In New York, glass-lined iron pipes, it is said, are being used to convey water, as the friction is lessened, the pipes are always clean, and the water is kept pure. Between the glass and iron is a layer of plaster of Paris, which, being a non-conductor of heat, prevents the water from freezing in the winter. Whether this layer prevents the contraction and expansion of the iron from destroying the coating of glass may be a question.

A Mortuary Chapel for Scarbro'.—The parish vestry have resolved that "it is expedient, as well on sanitary grounds as for the convenience of lodging-house keepers and for the interests of the public generally, that a mortuary chapel be erected at the cemetery;" and "that the Burial Board be requested to carry the foregoing resolution into effect, at a cost not exceeding 200*l.*"

Metropolis Buildings Act Amendment. On Wednesday last, Dr. Brewer brought in a Bill to repeal the 55th clause of 7 & 8 Vict., cap. 84 (the Metropolitan Buildings Act), so far as it relates to the slaughtering of cattle for human food. The Bill was read a first time, and the second reading was fixed for April 2.

The Works of the late Mr. George Mason, A.R.A.—Unusual pressure compels us to confine ourselves to recommending all our readers, who love art, to visit (through a member of the Burlington Fine Arts Club), the collection of pictures by the late Mr. Mason, now collected in the Rooms of the Club, Savile-row.

The Labour Question.—On Monday evening last, at the sessional meeting of the National Association for the Promotion of Social Science, Mr. Alsagar H. Hill read a paper "On Impediments to the Circulation of Labour and Suggestions for their Removal."

New Mint Site.—Mr. Ayrton has obtained leave to bring in a Bill for the removal of the Royal Mint to the new site selected for it.

TENDERS

For the restoration of Pulham St. Mary Magdalene Church, Norfolk. Mr. R. M. Phipson, architect:—

Hawes	£2,371	5	0
Cornish	2,366	0	0
Ludkin & Wells	2,250	0	0
Botwright	1,871	18	0
Grimwood & Vine (accepted)	1,825	0	0

For alterations and additions to Yelverton Rectory, Norfolk. Mr. R. M. Phipson, architect:—

Wright	£1,868	0	0
Downing	1,856	0	0
Newell	1,698	12	0
Cornish	1,695	0	0
Hawes (accepted)	1,520	0	0

For additions to Thornby House, Kenilworth, for Mr. Alfred Jepson. Mr. George Hart, architect:—

Jones	£1,310	0	0
Davis, jun. (accepted)	1,277	10	0

For the erection of Norgrove-buildings, Clark's-place, Bishopsgate-street Within (comprising wine-vaults, shops, and offices). Mr. Alfred W. Archer, architect:—

Harding (accepted)	£2,854	0	0

For the erection of schools, Olga-street, Bow, for the London School Board. Messrs. Hammack & Lambert, architects. Quantities by Mr. T. E. Mundy:—

Gibson, Brothers	£8,392	0	0
Newman & Mann	8,246	0	0
Wood, Brothers	8,073	0	0
Linzell & Son	7,993	0	0
Enmor	7,801	0	0
Williams & Son	7,586	0	0
Wicks, Bangs, & Co.	7,531	0	0
High	7,490	0	0
Marsland & Son	7,340	0	0
Roberts, Brothers	7,225	0	0
Dove, Brothers	7,115	0	0
Perry & Co.	6,680	0	0
King & Son	6,628	0	0

For building the Royal Marine Inn, Silver-street, Taunton, for Mrs. Crane. Mr. A. W. Galbraith, architect:—

Fox	£440	0	0
Templeman & Handford	420	0	0
Moss	392	10	0
Smith	360	0	0
Spiller	338	0	0
Yandell (accepted)	317	0	0

For alterations and additions to shop and premises, Nos. 91 and 93, High-street, Kensington, for Messrs. Barker & Co. Mr. J. Houle, architect. Quantities by Mr. D. Cubitt Nichols:—

Langmead & Way	£1,395	0	0
Bowles (accepted)	1,341	0	0

For the erection of a nave for St. Paul's Church, Bath. Messrs. Wilson, Willcox, & Wilson, architects. Quantities by Mr. Arthur Deane:—

Hunt	£4,182	0	0
Ridout	4,085	0	0
Long	3,872	0	0
Morgan & Lovell	3,760	0	0
Mullings	3,500	0	0
Long	3,498	0	0
Bladwell	3,450	0	0

For warehouses, Holborn Viaduct. Mr. H. H. Collins, architect. Quantities supplied by Messrs. Batstone & Hunt:—

Kirk (accepted)	£7,067	0	0

For the erection of an Oddfellows' Hall, Devizes. Messrs. Wilson, Willcox, & Wilson, architects. Quantities supplied by Mr. Arthur Deane:—

Marquis & Munro	£1,670	0	0
Long	1,598	0	0
Chivers	1,559	0	0
Randall	1,420	0	0
Mullings (accepted)	1,350	0	0
Brown	1,310	0	0
Aldridge	1,288	0	0
Durke	1,275	0	0

For dwelling-house, Portmadoc, for Rev. W. Ambrose. Messrs. Roberts & Morrow, architects:—

Humphreys	£520	0	0
Roberts & Jones	509	0	0
Griffith	478	0	0
Davies (accepted)	474	0	0
Hughes	394	0	0

For rebuilding the premises, Nos. 44 and 45, Milton-street; City, for Messrs. Corke, Abbott, & Co. Mr. Edmund Woodthorpe, architect. Quantities supplied by Messrs. Welch & Atkinson:—

Sewell & Son	£3,674	0	0
Macey	3,580	0	0
Ashby & Sons	3,443	0	0
Brass	3,435	0	0
Pritchard	3,372	0	0
Cooke & Green	3,351	0	0
Perry, Brothers	3,339	0	0
Colls & Sons	3,260	0	0
Conder	3,229	0	0
Turner & Sons (accepted)	3,147	0	0

For alterations and additions to mansion at Kingswood Warren, Surrey. Mr. William Smith, architect:—

Manley & Rogers	£5,347	0	0
Patman & Fotheringham*	4,750	0	0

* Accepted.

For English Presbyterian Memorial Church, Wandsworth. Mr. T. Arnold, architect. Quantities by Mr. N. C. McIntyre North:—

Jackson & Shaw	£5,643	0	0
Perry & Co.	4,800	0	0
Henshaw	4,789	0	0
Avis & Co.	4,723	0	0
Colls & Sons	4,700	0	0
Higgs	4,678	0	0
Adamson	4,654	0	0
Nightingale	4,614	0	0

For Coombes Croft House:—

Hinde	£1,085	0	0
Jarvis	869	0	0
Rest & Brown	790	0	0
Linzell & Son	693	0	0
Chapman	664	0	0
Humphreys & Son	650	0	0
Blandford & Jones	645	0	0
Childs	635	0	0
Bullford (accepted)	527	12	0

For alterations, extensions, and new fittings at 117, Victoria-street, Westminster, for the Army and Navy Co-operative Society, Limited. Mr. Thomas Dudley, architect:—

Wagner (accepted)	£1,035	16	0

For new show-rooms and alterations at Nos. 73 and 75, Brompton-road, S.W., for Messrs. Lewin Craucour & Co. Mr. A. Payne, architect:—

Wagner (accepted)	£395	0	0

For the first contract, Messrs. John Brinsmead & Sons' pianoforte manufactory, Kentish-town. Mr. Charles E. Evans, architect:—

		Additional Story.
Morter	£9,830	£1,140
Brass	9,780	1,120
Scrivener & White	9,478	1,094
Longmire & Burge	9,222	1,153
Kelly, Brothers	8,657	1,160
Gibson, Brothers	8,560	1,035
Manley & Rogers*	7,977	1,120
Niblett & Son	7,299	958

* Accepted.

TO CORRESPONDENTS.

R. (advertisement will be found in our last issue).—H. T. C. (the tenders reached us from more quarters than one).—H. A. (the District Surveyors' Association ("Building Act") may be addressed at No. 9, Conduit-street, W.).—H. A. V. ("Navvy" has become the correct word).—L. C. R. (published last week).—H. T. (next week).—R. A. D. (next week).—G. G. (thanks).—J. P. S. (thanks).—A. & W.—H. P. P. O. S.—E. W. C.—W. B.—H. W. P.—W. W.—W. H., jun.—Unionist.—C. E. E.—C. W. P.—A. B.—A. A. C.—Dr. W.—Dr. H.—R. & M.—E. W.—T. A. M.—W. R. B.—W. W. & W.—H. R. W.—T. N.—T. A.—Dr. M.—W. H. J.—R. M. P.—G. S.—W. C.—J. C.—D. B.—J. W.—W. J. W.—J. C. P.—C. C. H.—G. A. W.—One Willing to Go.—One Anxious to Travel.—W. J. R. M.—W. Y.—Athena.—R. T.—T. T. G.—A. W. G.—B.—K. & Son.—W. T.—F. A.—J. B.

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